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Setting out Plants.

CABBAGE

AND

CAULIFLOWER

FOR PROFIT.

BY J. M. LUPTON.

WITH FIFTY-THREE ILLUSTRATIONS.

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PREFACE.

Men's ideas change. The farmer who a few years ago was disposed to sneer contemptuously at farmers' books and "book farmers" now turns for information to the printed page. Gradually we have learned that intelligence, science, and study are no mean factors in the successful cultivation of the soil, and that the labor of the hands is most prolific when backed by the careful study of the brain.

It may be true that much has been written which has little or no practical value to the agriculturist, but the fact remains that the research of scientific men, given to the agricultural people through the medium of the printing press, has frequently turned a losing business into a paying one, while through the same medium the interchange of thought and experience of those who, like the writer of this book, have gained their education in the fields has been by no means without beneficial results.

How easy it is to tell in a few short sentences that which we have been years in finding out! Knowledge comes slowly and laboriously from the fields, and yet the closest observation of the character of a plant, its habits, likes and dislikes, and the habits of its enemies seldom goes unrewarded, and such knowledge as we gain, given to the public, may be the means of helping many a cultivator.

The work of the enterprising publishers of this book cannot fail to be appreciated. Already we have from their hands a

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number of little volumes, each one treating of some special subject, which are supplied to the gardening public at merely nominal cost. We regard this method as most commendable, because it concentrates the thought and experience of the writer upon some particular plant and disseminates a more complete knowledge of the character and habits of that plant than would be possible were the author's effort made to cover more ground.

Much has been written of Cabbages and Cauliflowers, and yet they are strangers to many a garden. The Cauliflower especially has by no means received that share of attention to which it is entitled, being almost unknown in some markets. This book will reach the hands of many a man who is struggling along to make both ends meet raising hay and wheat and corn. Possibly his difficulties might find solution in the adoption of a different line. Is there a market gardening section anywhere in your neighborhood ! If so, do you not find that one acre there is worth three of yours ; that three times the labor is employed to till it ; three times the fertilizer is expended on it ; it produces three times the crop ; brings the owner three times the profit, and finally the market value of the land itself is three times as great ?

We do not wish to be understood as advocating any general change on the part of farmers from an agricultural to a horticultural business. That such a change is desirable in thousands of instances I have no doubt, but the conditions which surround you and the results of your own experience are the best guides ; they alone can tell whether the ideas set forth in the following pages contain suggestions for the field or the kitchen-garden.

If there is one general idea more than another which is detrimental in its operation to the welfare of our agricultural classes it is the old notion that we must continue to plant the same things which our fathers planted before us. Many a

farmer is to-day growing wheat at a loss for no better reason than that his father grew wheat before him. Wheat has always been grown on the farm, and although it don't pay he still continues to plant it. These methods are ruinous. To him who can grow wheat at a profit we must yield the palm. To many of us the secret of success lies in boldly stepping out of the old tracks to look for the reward which is found in keeping abreast of the times.

A hope comes to me as I write, a hope that somewhere within the pages of this book there may be found a suggestion, an idea, a thought, which, taken into the fields, may prove of practical value to some one who will read this book. This must be the author's apology for his work.

J. M. L.

MATTITUCK, LONG ISLAND, N. Y.
January, 1895.

CABBAGE AND CAULIFLOWER.

CHAPTER I.

INTRODUCTORY.

Before proceeding to any consideration of the cultivation of cabbages and cauliflowers, it may be well to look briefly into those conditions which render the crop profitable and its planting desirable.

Thousands of farmers to-day are turning over in their minds the desirable features of this or that special crop. Many of them are puzzled for a satisfactory solution of that ever-recurring question, "What shall we plant?" I am a believer in specialties, both for the farmer and the gardener. While it is not advisable to depend too fully on any one thing, it is always a good plan to have some leading crop which should receive a good share of our attention. In this way we may become more than usually proficient in the cultivation and production of this particular crop, and, what is more to the point, our name becomes known in the markets for the excellence of the goods. In this way a trade is established. The produce which is known to be good is always in demand. It is singled out by the grower's name on the package and finds ready sale at remunerative prices, while an unknown brand is neglected or sold for a song.

In considering the advisability of planting cabbages or cauliflowers, the market we have at hand and our facilities for

reaching it should receive careful attention. These crops are both bulky and perishable; they may both be carried long distances, but in warm or wet weather are likely to reach the market in unsatisfactory condition unless promptly handled. This is especially true of cauliflowers. The early crop of this vegetable, marketed in the months of June, July, or August, ought to reach the consumer in twenty-four hours after being cut in the fields. The late crop, however, marketed in the months of October and November, will stand carriage of three days if proper care is taken to put them up in good condition.

Our situation should be such that we can handle the crop promptly at maturity and at no excessive cost for transportation. If a man is located eight or ten miles from the railway station he will find that the item of cartage is so great as to leave but small margin of profit in the close competition of the present time. If he is located on a railway line where freights are so slow and unsatisfactory as to make his shipments uncertain, and express charges are so high as to make shipping by express too costly, he should first secure the proper transportation facilities, or the planting of these crops may result in disappointment.

The gardener who is situated within driving distance of a large market is always at an advantage over his more distant competitor; not only can he make considerable savings in the matter of commissions on sales and transportation, but, being in constant communication with the market, he is always in a position to take advantage of its fluctuations. This is well worthy of the attention of intending purchasers. The land for gardening purposes within ten miles of a great city may cost five times the price of equally suitable land one hundred miles away, but it is well worth the difference. The better opportunities offered by its position will always enable a man who is wide awake and alive to his

opportunities to realize enough more to pay the additional interest on his investment, and the natural expansion of any large town ought to insure him against pecuniary loss in the event of a desire to sell.

But these facts need not deter a man from planting cabbages or cauliflower provided he has or can secure the proper facilities for reaching market. What is to-day the greatest cauliflower-producing section of the country is located seventy to ninety miles from New York city.

In summing up this question of profit and loss on such crops, I cannot do better than to relate briefly the effect of the development of this and similar productions upon a section which has, during the period of this development, been fully under the observation of the writer.

At the present time perhaps a fair market value for good farming land here, favorably situated, might be placed at $150 per acre. This is probably double the value of the same land fifteen years ago, and cannot be laid to any influence outside the gradual development of the agricultural and horticultural interest. Within the same period the money-producing power of our farms has probably increased threefold,—in many instances much more. I have seen the farm of one generation divided into three parts by the next and each part made to produce three times the value of the original whole. At the same time there may be found, at one-half the distance from our great markets of New York city and Brooklyn, just as good land which has not gained a dollar in its marketable value during the same period. There we find farmers who continue to follow the old ruts and, throwing away the opportunity which is within their reach, insist on keeping up the hopeless competition with the great West in the production of hay, corn, and wheat.

Thus we find under our own eyes two sections, one practically at a standstill, farmers discouraged, struggling along to

make both ends meet, and making really no headway. The other, under conditions precisely the same, goes forward with the rest of the world,—farmers doing more business, meeting with more success, living in greater comfort,—and why? Well, back of it all I can see the introduction of two plants which has led to a narrowing down of the farm crops in favor of the greater opportunities to be found in the cultivation of some specialties of the garden, the same two plants which form the subject of the writer's work, and are worthy of the reader's most careful consideration.

CHAPTER II.

SEED.

A QUESTION OF THE FIRST IMPORTANCE.

I feel constrained to enter into this question more in detail than usual with a book of this character. Seed does not enter largely into the cost of producing a crop; for this reason its importance is frequently overlooked, and yet we *must* have *good* seed or every expenditure and every effort is at a discount. This is particularly true of the two plants we have under consideration, and for this reason, and because we think it well for every cultivator to become well-acquainted with the plant he grows, I shall give expression to a few thoughts on seed breeding.

Size, appearance, and germinative power have nothing to do with the actual quality of seed. Though these characteristics are valuable in themselves, they are fully as good and frequently better in seed of poor quality than in the best.

The peculiarities and valuable traits of character are no more surely transmitted from one generation to another in the animal kingdom than they are in the vegetable world, and the character of the parent stock is, above all other considerations, that which determines the quality of the seed.

The only part of the cabbage plant which we now regard as valuable, *i. e.*, the head, was not a natural product of the plant, which, when first discovered, produced simply a cluster of leaves. The head is a result of cultivation and breeding with the purpose of its establishment. The development of the heading capacity of the plant has been going on for years,

and is still going on, probably no similar period in its history showing more improvement in this respect and in the quality of the seed sold by seedsmen than the last ten years.

The means adopted to secure this end are principally a constant series of selections for seeding purposes.

While it is impossible here, and perhaps undesirable, to enter into any consideration of the multitudinous features of different varieties, we may look briefly into some of the general characteristics which run in greater or less degree through the cabbage family generally.

Let us look at the leaves. Here we see a decided difference

FIG. 1.—Leaf of Good Type.

FIG. 2.—Leaf of Poor Type.

between what we would consider a good type and a poor one. We find in the good types that the leaves are broad, nearly round in form, the leaf extending to the juncture with the stalk, the smaller veins running well down and joining the mid-rib at the base where it joins the stalk. In the poor type it is different. Here a stem, sometimes as much as six or eight inches long, intervenes between the leaf proper and the stalk; as the botanist would say, it is petioled. The leaf itself is comparatively narrow, while its general character is different, as shown in Figs. 1 and 2.

The leaf of a good type is of a spoon-like form, following

in shape the contour of the head, the upper edge turning up.

On the other hand, the leaf of a poor type stands out nearly straight from the stalk, the outer edge usually turning down. This feature will be observed in greater or less degree according as the plant is more or less faulty.

Next let us look at the stalk, and we find that the two evils frequently go together, the faulty leaves usually being affixed to a poor stalk. In the good type the stalk is short but strong, quite large immediately under the head where the outer leaves join it closely one upon another; it tapers sharply to its

FIG. 3.—Showing Character of Stem in Good Type.

FIG. 4.—Character of Stem in Poor Type.

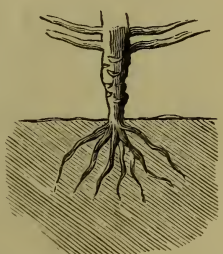

FIG. 5. — Showing Stem Long from Over-crowding.

junction with the ground, at which point it is comparatively small. In the poor type almost the reverse will be observed. The stalk is larger at the ground, much longer, and the leaves, usually of the petioled form, join the stalk more loosely. It is true that the stalk of a plant may be made long by overcrowding, in which case the fault is not, of course, with the plant; but the difference resulting from such cause is readily detected by the expert and ought not to be misunderstood. To make the different features more clear, we invite a study of the accompanying illustrations.

Let us now look at the head, which we have referred to as

being an unnatural production of the original plant. We find here a constant tendency to revert to the original type, and the defects which we have previously noted in the leaves and stalk appear to have little to do with a faulty construction of the head—that is, we frequently find the faulty construction in the plant where the head appears all right, though small, and, on the other hand, it is no uncommon thing to find a very poor head on a good plant.

Aside from any consideration of form, which differs in different varieties and cannot be entered into here in detail, the point most to be sought for in cabbages of all classes is

FIG. 6.—Showing Cabbage Solid at Base of Head.

FIG. 7.—Showing Cabbage not Solid at Base of Head.

solidity. If faulty in construction, the head will lack solidity, either directly on top and at the center or upon the under side near the stalk. This defect may be understood by a study of the accompanying figures.

A lack of solidity at the base of the head may readily be determined by placing our hands under the base of the head, between it and the outside leaves, when we can tell by pressing upward against the head if its formation at the base is close and compact insuring solidity, or if it be loose, and for this reason likely to deteriorate in successive generations.

Cabbages of loose formation at the base of the head, even

though they may be perfect specimens in other respects, are much lighter in weight than where the formation is solid, and should be avoided so far as possible.

This point is well worthy the consideration of the seed breeder, but it is by no means a matter of so much importance as a lack of solidity at the top and center of the head, for in this we find that tendency to revert to the original type which produces no head at all and is worthless (Fig. 11).

In the consideration of this feature, we find that the leaves which go to make up and form the head must, in all instances,

FIG. 8.—Head of Perfect Specimen. Solidity Insured by Leaves Growing across the Top.

lap over and across the center (Fig. 8), and the farther we can go in this direction the better will be our cabbage.

On the other hand, if the leaves forming the head do not lap across the center (Figs. 9, 10), but leave a triangular space at the center of the head not covered by the outer leaves which form it, even though in this instance the head may appear fairly solid, successive generations will rapidly deteriorate, and if used continuously for producing seed might result in great depreciation of the heading capacity of the plant.

The health and vigor of a plant is a feature which neither

FIG. 9.—Head of Imperfect Specimen Lacking Solidity, from Failure of Leaves to Lap across the Center.

FIG. 10.—Showing Deterioration of the Plant in Succeeding Generations, when Bred from Imperfect Types, as shown by Fig. 9, and Reversion toward the Original Type of Cabbage as illustrated by Fig. 11.

a seed-grower nor a gardener can afford to disregard. A strong constitution is plainly discernible in the color and

robust habit of growth of the plant, while impaired vitality is easily detected by a peculiar glassy appearance, and pale, sickly coloring of the leaves. It is a disregard of the importance of this feature which causes a variety to "run out." The constitution of the plant has become so enfeebled that it fails to produce seed of good germinative power, and the plant so readily succumbs to the attacks of its natural enemies as to render its cultivation unprofitable.

The principal faults which we have noted in the construction of the cabbage plant, those of the leaves and stalks, may

FIG. 11.—Illustrating Wild or Original Type of Cabbage.

apply with some modifications to the cauliflower plant also. The leaves are, of course, long by comparison, but in the good type will stand closely up to and around the head, while in those of faulty construction they stand out almost horizontally from the stalk, which presents the faults we have noted in the cabbage.

Loss to the gardener from poor cauliflower seed usually results either in the entire failure of the plants to produce heads or in the inferior character of the heads when produced.

We have seen whole acres which produced enormous heads of utterly worthless trash, as well as acres which produced no heads at all, and our experience leads us to believe that the fault lies in each instance with the seed, and with the seed alone. The failure to head seems to be largely the result of planting seed grown in a southern country. We have been utterly unable to secure a crop of cauliflower from seed grown in Italy, while the same variety from seed grown in Denmark would produce finely, and it is quite probable that the length of the season in which the seed is produced is a potent factor in determining the length of season required to mature the product of that seed. Be that as it may, it is a fact that while the plants from seed grown in southern countries grow vigorously, and apparently mature, it is only in isolated cases that they will produce heads in this latitude.

The other source of failure is clearly the result of bad seed-growing. We have seen fields where nearly every plant produced a beautiful head, clear, white, and perfect, while but a few rods distant another sample of seed grown under the same conditions, upon the same soil, and with the same care and attention, produced heads so covered with leaves as to be worthless. For this we can see but one cause: those plants which have given us good heads and profitable returns were produced from seed of equally good plants, while those which have produced nothing worth marketing, and entailed upon us a loss of money and labor, were the product of seed grown from impure and worthless stocks. This is nature's law, and the responsibility for our loss belongs to the seed-grower who has produced the seed and the dealer who has sold it.

But where shall we get good seed? Ten years ago a gardener would have told you that you must grow it yourself. It was the custom a few years ago, and to some extent the custom prevails to-day, for gardeners to grow their own seeds and a small supply for the requirements of their neighbors,

which they retailed to them at a rather extravagant price. This is not practiced so much as formerly. The gardening public are looking more and more to the seedsmen for their supplies, and on inquiring among our more progressive gardeners I am gratified to find a growing belief that they can secure even better seeds from the seed store than they can grow themselves. I say gratified, because this is right. The professional seedsman and seed grower brings more study and thought, more knowledge, experience, and intelligent effort into the development of a plant than is possible to the gardener with the multitudinous duties of the market garden on his hands, and it is to them we must turn for the greatest advancement toward better things. But what we want above all things is to know that this professional knowledge has been applied to the particular lot of seed we are about to plant. This we can only know by our faith in the man of whom we purchase.

Above all other considerations I am impressed by the fact that safety to the agricultural and horticultural world lies in the creation of a demand for the very best, and that only. Cheap seed is dearly bought. Low prices force the grower to adopt the cheapest means of production, with inferior quality as a sure result.

He who would succeed in the growing of these vegetables must pay little attention to the price at which the seed is offered, but make sure that it comes from a source where quality is made the first requisite, and that it has had in its production the benefit of that knowledge and intelligent work so necessary to success.

CHAPTER III.

THE SOIL AND ITS PREPARATION.

While it is true, as we have often seen it stated, that cabbage or cauliflower will thrive on a great variety of soil and grow to some extent on almost any soil, the choice of location has always an important bearing on future success. Continued planting upon the same piece of ground is usually attended with disastrous results, and it is very unwise to follow such crops as turnips, Brussels sprouts, or plants of similar character. Experience leads us to believe that the ideal condition of soil for the late or fall crop of cabbage or cauliflower is found in an old pasture lot of rich land, which has been plowed early in the spring and kept harrowed and cultivated during the summer until its use is required in July, when it can again be plowed, the sod by this time being well decomposed. It is upon such land, prepared in such manner, that we have seen these plants attain their highest state of development, and, where the land is not too valuable and a considerable portion of the farm is kept in grass, this method of preparation is advisable for a late crop. The extra expense of summer cultivation will be amply repaid by the increased value of the fall crop grown under such favorable circumstances.

With the average market gardener, however, this plan is next to impossible; his land is valuable from its location in close proximity to a large town, and he finds it necessary to keep every available acre filled with a growing crop during

the entire season, while but little, and in many instances no land at all, is devoted to grass.

Here the most popular method seems to be that of following the potato crop, the late planting of cabbage or cauliflower being made upon land from which a crop of early potatoes has been taken off, and the spring planting being made most frequently upon ground where late potatoes were harvested the previous fall.

Every practical market gardener knows, however, that the continued cropping of the land induces a mechanical condition unfavorable to the growing crop; the constant tramping over the fields incident to cultivating and harvesting the crop so packs the soil that something in the nature of loosening material must be plowed under in order to secure that condition conducive to rapid growth and healthy development. Where horse manure can be readily secured and forms the main reliance for fertilizing material the danger from this source is reduced to a minimum, but outside the radius of a few miles from the large towns this article is usually hard to obtain, as well as expensive. In such instances it becomes necessary to supply in some other way the loosening element so absolutely necessary to continued success. A fairly satisfactory condition may be obtained by plowing under some green crop, and the benefits arising therefrom will be noted for several years. Clover is unquestionably one of the very best plants for the purpose, and its character is such that, with liberal supplies of potash, it can always be grown upon good land.

The fall crop can be planted upon a clover sod from which a crop of hay has been removed earlier in the season and the second growth plowed under with excellent results, the change from those crops requiring continuous cultivation to those of the character of clover seeming to have the effect of renovating the soil and leaving it in healthy condition. Millet is

also an excellent plant for this purpose, and the various grains are used to some extent, oats proving most satisfactory in the experience of the writer.*

The one thing which is essential to continued success is the keeping of the ground in good mechanical condition, which gives the air free access to the roots of the plants and enables the delicate fibers to reach out with the utmost freedom.

Good, rich land in which we find a strong suggestion of sand, which renders it free and loose, is unquestionably the best soil for such crops. Of course, the cultivator, being compelled to take things as he finds them, may not always have at hand just such a piece of ground as he would like, and the question he has to decide is, if with the soil that is available he can expect satisfactory results. A stiff clay soil which breaks up in lumps and clods in the spring and is liable to crack and bake as the season advances is not a good place for such crops, and such soils should be previously prepared by underdraining and liberally supplied with organic matter before we can hope for success. At the same time the soil should be of a retentive character, as the plants require a great deal of moisture for their most perfect development. We would, therefore, caution our readers against planting upon too sandy a soil, or one which will not withstand a reasonable amount of dry weather; gravelly hillsides should be avoided if possible, and a location secured where the crop may be kept in growing

* Wherever crimson clover can be grown it ought to prove a most valuable green manure for these crops. Not only does it improve the mechanical condition of soils, but being one of our best gatherers of atmospheric nitrogen, supplies at minimum cost the most expensive element of a complete manure. The quick growth of the plant, the rapidity of decomposition when turned under, and its activity in reducing to soluble forms inert soil constituents renders crimson clover one of the most important plants of the great order of Leguminosæ.

condition during hot, dry weather. Excessive rainfall does not, as a rule, cause much damage to such crops, especially those grown in the fall when the weather is cool, but constant stirring of the soil is as undesirable at such times as it is absolutely necessary in dry seasons. In wet times it is best to keep off the land, except so far as may be necessary to keep the crop free from weeds, while in dry weather the more we stir and cultivate the soil the better the crop will grow.

The previous history of the piece of ground should always enter into our choice of location. An interval of two or three years should, if possible, elapse between successive plantings, and such a rotation as will admit of this is desirable. We should recall, also, our success with the previous crop, which, if attacked by any disease liable to be perpetuated in the soil, will render planting for several years unprofitable.

CHAPTER IV.

FERTILIZERS.

Soil fertility is now one of the most important questions with which we have to deal. This is particularly true in regard to the lands of the Atlantic States, where the fertility of the soil has been depreciated by failure to restore the plant food taken from the land in crops. These methods are extending further and further to the west, and the same impoverishing influence is at work upon the newly cultivated lands but recently brought under the plow.

It is fortunate for the agriculturist that the study and research of scientific men have made more real practical progress in this direction than in most lines where science has been applied to agriculture. Farmers and gardeners have, as a rule, been slow to believe in those elements of fertility which the chemist told them contained all the needed plant-food for a given crop. They sneered at the chemist's analysis and shook their heads doubtfully at the scientist's conclusion. The supplies furnished by the barnyard were exhausted and the balance of the farm planted on faith; but faith didn't work; gradually the farm grew poorer and the farmer's condition reflected that of his farm. Finally, although the lesson has cost him much, he has learned that the scientist was right, that the three elements of nitrogen, phosphoric acid, and potash were what was needed to make the crop grow, and that these three elements were found in various substances and in various forms, and obtainable in the open markets.

This being conceded, the question, therefore, at this time

is pretty well narrowed down to a consideration of the proper proportions of each of these elements which our crops require, and the same consideration of cost which enters into all our business transactions.

Both cabbage and cauliflower crops are gross feeders; to plant them on poor land poorly manured is to invite failure. Every authority on the fertilizing material required by such plants agrees in this, that an unusual amount of nitrogen is necessary to secure the most perfect development of the plant. This is, without doubt, supplied by horse manure, but we are now considering other forms of fertilizing material—in fact, the instances where farms or gardens are so situated as to be able to obtain a supply of horse manure at a reasonable cost are becoming so rare, that the fertilizer question as applied to the chemical or commercial fertilizers is much the more important one.

First of all, we should be sure that we secure a sufficient amount of nitrogen. This, if in the form of ammonia, should never be less than six per cent. of the whole, and it is rarely that a fertilizer is made which contains more than six per cent. It is probable, therefore, that from five to six per cent. of nitrogen is about the proper proportion, and to our mind it is equally important that a portion of this nitrogen be derived from animal matter, while the balance be obtained from some chemical source. The growth which follows an application of some of our high-grade agricultural chemicals, such as nitrate of soda or sulphate of ammonia, is always very strong and vigorous; but we have secured the most satisfactory results when the quick action of these materials is supplemented by the slower but more lasting influence of such materials as dried blood, fish scrap, tankage, or some of the prepared forms of animal matter which any fertilizer dealer is glad to sell you.

Phosphoric acid, which is usually secured from ground or dissolved bone, bone-black, or the so-called "Rock" phos-

phates of the South, should be supplied to the extent of from six to eight per cent. Of the forms of phosphoric acid which have come under our observation, we think the best source from which it can be obtained is some form of raw bone, which also contains a small percentage of nitrogen. As between the bone-black—or the bone which has been burned in the process of sugar refining and then treated with acid—and the rock phosphates, we have been unable to detect any practical difference. Bone-black, in most markets, will usually cost about 20 cents per unit of phosphoric acid more than the rock phosphates, and therefore a fertilizer containing seven per cent. of phosphoric acid would cost $1.40 more per ton if that phosphoric acid were derived from bone-black than if we secured the same percentage from South Carolina rock. The wisdom of this increased expenditure is extremely doubtful—in fact, so far as experiment or practical experience has ever shown, one article has no advantage over the other. I am fully aware that there has always existed a prejudice against the rock phosphate in the minds of many farmers and gardeners, and this prejudice is, without doubt, fostered by the bone-black dealer, and probably has as much to do with that increased cost of 20 cents per unit as any consideration of actual value. We regard this prejudice as due mainly to ignorance of the actual composition of the rock phosphates and a feeling on the part of some purchasers that in buying them they are merely buying stone. To our mind the best material from which to secure phosphoric acid in a fertilizer is raw bone ground finely or dissolved in sulphuric acid to render it the more available, provided it can be obtained at a reasonable cost; but if the purchase of this material increases the cost of our fertilizer to any very considerable degree, we should use the rock phosphate for our phosphoric acid rather than pay the increased cost of bone-black.

Potash must of necessity be supplied from high-grade

muriate or sulphate, as in none of the low grades of potash salts can we secure the required percentage of actual potash in a fertilizer which must also contain five to six per cent. of nitrogen and six to eight per cent. of phosphoric acid. The percentage of actual potash required to grow a crop of cabbage is not fixed with the same degree of certainty which we feel in regard to the other ingredients composing a high-grade fertilizer. We feel sure that less than two per cent. is almost useless in any fertilizer, and the quantity fixed for a cabbage fertilizer of high grade is usually from seven to ten per cent. We believe that the first figure is sufficient and represents as large an amount of actual potash as the crop can use to advantage.

Our conclusions are, then, that a complete high-grade fertilizer, capable of growing and fully maturing the most profitable crops of cabbage or cauliflower, should be made up, as near as possible, as follows :—

Five to six per cent. nitrogen.	2½ per cent. to be derived from sulphate of ammonia or nitrate of soda. 2½ per cent. from dried blood, fish scraps, or some other form of animal matter.
Six to eight per cent. of available phosphoric acid.	To be derived from dissolved bone, bone-black, or rock phosphate.
Seven to nine per cent. of actual potash.	To be derived from sulphate or muriate of potash, or both.

The goods at the present day being sold almost entirely under a guaranteed analysis, it is comparatively easy for any one to figure out a formula suited to his purpose. For instance, we can secure 2½ per cent. of nitrogen from sulphate of ammonia analyzing 20.50 per cent. by the use of 250 pounds per ton ; 2½ per cent. from animal matter containing

ten per cent. nitrogen we can secure from 500 pounds of ground fish scrap, which would give us also about 1½ per cent. of the required quantity of phosphoric acid. From five to six per cent. more can be obtained by the use of about 850 pounds of dissolved South Carolina phosphate, while the required potash can be found in 200 pounds of 80 per cent. muriate and 200 pounds of 80 per cent. sulphate of potash, thus making the 2000 pounds and analyzing as above stated.

This example is not given with the idea that it should in all cases be followed. The important point is this: that every one should understand the comparative value and the practical fertilizing value of the various materials; then his own position and the facilities for securing certain ingredients must have its influence on his purchases.

It is not necessary that we should enter extensively into the question of cost here. Almost all such goods are now required by law to be sold under a stated chemical analysis, which the dealer must guarantee. Such a fertilizer as that of which we have spoken would be known among dealers as a high-grade complete fertilizer, and should cost the farmer from $33 to $35 per ton, according to his position and facilities for securing such goods.* But, while we do not intend to enter into the cost of the various items in detail, there are certain elements of cost to which we shall call your attention, because of a prevailing tendency on the part of all cultivators of the soil to consider the lowest-priced article the cheapest.

There is the cost of transportation. It matters not whether the goods are delivered at your station, freight prepaid, or otherwise, the cost of transportation is certainly and in all cases taken from the consumer, and if it be $2 per ton on fertilizers having a manurial value of $20 per ton it is no greater on fertilizers having a manurial value of $40 per ton.

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* See note on Commercial Fertilizers at end of chapter.

The percentage which the cost of transportation bears to the actual value of the goods would therefore be double on the low grade to that on the high grade. This is equally true in regard to various other items of expense which the purchaser is compelled to pay, but which add nothing to the actual value of the goods. Bags cost as much per ton on low-grade as on high-grade goods; the cost of manufacture does not materially differ; the cost of handling is the same, and a dealer's profits, while they may not amount to quite as much per ton, bear the highest percentage on the lowest-priced articles. A little reflection will convince any one of these facts, and they are well worthy of your consideration. The question you are to decide is not how much stuff you can buy for a given sum, but how you can invest that sum to secure the greatest possible return.

Another thought comes to our mind just here, and, while we may digress somewhat from our subject in giving expression to it, we feel that its importance warrants the digression. Wherever we go among the cultivators of the soil we find a credit system in practice, which is a sad reflection on the intelligence and business capacity of our agriculturists. With money nominally at six per cent., in some sections perhaps at seven per cent., the agriculturist class usually pay from 10 to 15 per cent. for their accommodations. But the farmer will say, "I haven't the money to pay in advance, but must wait till the crop comes in." Neither has the dealer the money. He can secure it at the legal rate and is willing to advance it to you in the shape of supplies at double the rate, plus a profit on the supplies. The influence of such a credit system, which is in common practice in many sections, is wholly bad and much to the disadvantage of the producer. If he enters into an agreement with a party to secure his supplies from him and pay for them with his produce he can but expect to pay to the handler three profits:

first, a profit on the supplies purchased; second, a profit on the credit secured, and, third, a profit on the sale of his produce. Both the profit on the purchase of supplies and on the sale of the produce are perfectly legitimate and, of course, to be expected, but the profit on the credit can hardly be considered so, and yet, in some shape, it is probably paid by three-fourths of our agricultural people. The influence of the system tends to loose business methods on their part, and in many instances really places the management of their financial affairs in the hands of third parties.

In some instances it is true that it may be to our advantage to buy from and sell to the same parties,—such is the case wherever we can secure a narrowing of margins by so doing,—but mortgaging our crops or agreeing to deliver them to certain parties at any cost in payment of advances cannot fail to have a tendency to destroy our independence and debar us from securing the benefits of that competition which alone can secure us justice in the open market.

NOTE ON COMMERCIAL FERTILIZERS.—The present high price of sulphate of ammonia, due to the decline in production and increased consumption in the manufacture of artificial ice, has practically placed this salt, at least for a time, beyond the reach of farmers.

There have been other sources of nitrogen, such as dried blood, fine ground dried meat, fish, etc., which could be bought much cheaper. By using some such animal matter in connection with nitrate of soda a very considerable saving has been possible.

Experience shows that crops requiring a moderately long season to complete their development thrive best when nitrogen is supplied in a variety of forms varying in solubility and availability. Theoretically, a complete, well-balanced fertilizer for cabbage, or, in fact, any crop requiring a considerable part of the season to complete its growth, should contain nitrogen in the three forms of nitric acid, ammonia, and organic nitrogen. And in practice we find this to be true. Nitric acid or its compounds are very soluble in soil water and are not only at once available for the young plants, but are liable to be washed away in case of prolonged periods of

rain. Ammonia salts and organic nitrogen are less soluble and, being more slowly and regularly made available for the crop, keep it supplied with nitrogenous food until maturity.

If, by reason of scarcity or high price, we cannot so balance our fertilizer as to use each of these three forms of nitrogen, we may generally dispense with one or substitute some form of organic nitrogen in its place. Suppose we want a mixture with the same content of nitrogen, phosphoric acid, and potash as given in the formula on page 29, but we wish to substitute for the expensive sulphate of ammonia some fertilizer stock that will supply the required nitrogen in desirable form :—

We find that nitrogen in dried fish, dried blood, meat scrap, etc., can be bought at a difference that warrants us in making the change.

Dried ground meat contains from 10.50 to 11.50 per cent. of nitrogen, and about three per cent. of phosphoric acid.

We want—

2½ per cent. nitrogen from dried meat = 59 lbs.
2½ per cent. nitrogen from nitrate of soda = 50 lbs.

Our ground meat contains 11.25 per cent. nitrogen.

To obtain the requisite number of pounds of nitrogen, we must, therefore, take as many hundred pounds of dried meat as 11.25 is contained in 50, and as many hundred pounds of nitrate of soda as 15.75 is contained in 50, or we have—

1. 50 ÷ 0.1125 = 444 lbs. of meat scrap.
2. 50 ÷ 0.1575 = 316 lbs. of nitrate soda.

Instead of taking phosphoric acid from the more expensive bone-black, we will use dissolved S. C. Rock, which contains say 12 per cent. of available phosphoric acid, of which we want 5 per cent., or 100 lbs.

100 ÷ 0.12 = 833 lbs. of dissolved S. C. Rock.

Our potash (nine per cent., or 180 lbs.) is taken from 80 per cent. muriate, which contains 50.51 per cent. of actual potash—

180 ÷ 0.5051 = 356 lbs. of potash.

We now know what quantities of materials are needed to furnish the requisite percentages of fertilizing constituents, but on adding the quantities together, find the total sum to be 1960 pounds. We may add 40 pounds of land plaster or dissolved S. C. Rock, or slightly alter the

weights without materially changing the relations of fertilizing constituents. Suppose we make our formula to stand thus:—

Nitrate of Soda,	320 lbs.
Ground Meat,	450 "
Dissolved S. C. Rock,	870 "
Muriate of Potash,	360 "
	2000 "

We now have the requisite number of pounds; let us see how the composition of our mixture stands:—

Pounds.	Material.	Nitrogen.	Phosphoric Acid.			Potash.
			Available.	Insoluble.	Total.	
		lbs.	lbs.	lbs.	lbs.	lbs.
320	Nitrate Soda (15.75 per cent. N.).	50.40	. . .	. . .	. . .	. . .
450	Fine Dry Ground Meat.	50.62	. . .	. . .	15.43	. . .
870	Dissolved S. C. Rock.	. . .	104.40	27.84	132.24	. . .
360	Muriate Potash (80 per cent.).	. . .	. . .	. . .	. . .	181.83
2000	Total quantities in one ton.	101.02	104.40		147.67	181.83
	Per cent.	5.05	5.22		7.38	9.09

The above tabulation is by no means the complicated affair that it may seem to be at first sight; the farmer can very readily verify the several calculations with no more knowledge of mathematics than is required in disposing of his crops, thus: We have 320 lbs. of nitrate of soda, in each 100 lbs. of which there are 15.75 lbs. of nitrogen. Therefore,

$$3.20 \times 15.75 = 50.40 \text{ lbs. of nitrogen.}$$

The ground meat contains 11.25 per cent. of nitrogen, and 3.43 per cent. of phosphoric acid.

$$4.50 \times 11.25 = 50.60 \text{ lbs. of nitrogen, and}$$
$$4.50 \times 3.43 = 15.43 \text{ lbs. of phosphoric acid.}$$

The S. C. Rock contains 12 per cent. of available and 3.20 per cent. of insoluble phosphoric acid.

$$8.70 \times 12 = 104.40 \text{ lbs. available phosphoric acid.}$$
$$8.70 \times 3.20 = 27.84 \text{ lbs. of insoluble phosphoric acid.}$$

In the 360 pounds of 80 per cent. muriate we have $3.60 \times 50.51 =$ 181.83 lbs. of actual potash.

Then add up the several columns, divide by 20, which is the number of hundred pounds in one ton, and the quotient will be the per cent. of each fertilizing constituent. Thus, the nitrogen column will add up 101.02 lbs. Divided by 20, it gives 5.05.

$$(101.02 \div 20 = 5.05 \text{ per cent. nitrogen.})$$

The percentages of available and total phosphoric acid and of potash are found in the same way.

In this formula we have used dissolved S. C. Rock, because it is usually the cheapest form in which to buy soluble phosphates.

The difference between the cost of phosphoric acid derived from dissolved bone and bone-black on the one hand, and from dissolved rock phosphate on the other, has never been warranted in comparative trials by us.

In the foregoing mixture we might have taken phosphoric acid from 870 lbs. dissolved bone meal, which would have given the formula 6.18 per cent. of nitrogen and 8.43 per cent. of total phosphoric acid, or we might have divided the phosphoric acid between dissolved bone and rock phosphate, in which case the content of nitrogen and of phosphoric acid would have been slightly increased over that of the first mixture.—PUBLISHERS.

CHAPTER V.

INSECT ENEMIES.

It is perfectly fair to assume that the nearest neighbor to every tiller of the soil is either a bug, a worm, or a louse, who is trying for dear life to eat him out of house and home.

It is with anything but a feeling of confidence that we approach this subject, for the insect enemies of the particular plants which we have under consideration, at the present time, have the best of the battle. The most prominent which we have to contend with are the Flea Beetle, which must be fought as soon as the germ appears above ground, the Green Cabbage Worm, the Cabbage Aphis (those villainous little blue lice which destroy whole fields and completely change the character of the plant), and the Cabbage Maggot, which works at the root or stem of the plant below the surface of the ground. In other parts of the country the Cabbage Plusia, Cabbage Mamestra, Zebra Caterpillar, and Harlequin Cabbage-bug are common and quite destructive.

The Wavy-striped Flea-Beetle (*Phyllotreta vittata*) is comparatively easy to dispose of, as its attacks are serious only to the plants in their earliest stages of growth. With us nothing is so effective as tobacco dust, which is always liberally sprinkled over the plants as soon as they are seen breaking through the ground. If the work is not neglected at this time, it is comparatively easy to get the best of the fleas, and as the plants become stronger they are largely able to resist these attacks themselves, but for the first ten days of their existence they must have constant attention, the secret of

success being, in this instance, for the grower to be on the ground before the beetle. It is best to do the work early in the morning when the plants are wet with dew, but if the fleas are thick the work should never be delayed until a favorable time. After this an occasional dusting will keep them free.

The Green Cabbage Worms have not been so troublesome in cabbage-growing sections for the last few years as formerly. Their attacks are serious when they are very numerous at the time of transplanting. At this stage, when the plants are just recovering from the shock of being torn from the seed-

FIG. 12.—Imported Cabbage Worm. *a*. Larva. *b*. Chrysalis. *c*. Male butterfly. (*Riley*.)

bed, and growth is necessarily slow, these worms will sometimes eat the leaves fast enough to destroy the plant. The life of the worm appears to be a short one, however, and if they do not appear until the plant has secured a good root-hold, the danger is not, as a rule, serious.

We have both a native and European species which attack cabbage and cauliflower. The butterflies are much alike in appearance, the wings are generally white or yellowish with indefinite black marks above and with yellow or green markings on the underside. The worms differ in color, the im-

ported species being green while our native one is pale blue with yellow stripes. The young caterpillars of the imported cabbage worms are pale yellow, but as they grow older, change to green with a faint yellow line down the back and a row of yellow spots on each side. The full-grown caterpillars are from an inch to an inch and a quarter long.

FIG. 13.—Female. (*Riley.*)

The adult butterfly emerges in the spring and lays eggs from which the first generation of worms is produced. Several broods develop during the season.

Remedies.—We think the only successful means of combating them is with poison, and find that Paris Green will kill them as effectually as it will the Colorado Potato Beetle, and if applied intelligently it can be used with perfect safety. When the plants are just beginning to grow in the field after transplanting, these worms may sometimes be found very numerous about the center of the plant, seeming to prefer the young and tender leaves as they are developed from the center of the plant. At this stage of growth Paris Green can be used without danger of poisoning the cabbage head, because these leaves do not form a part of the future head, and even if the poison were not washed to the ground by subsequent rains, as it undoubtedly would be, the development of the plant, coming from the center, these leaves soon become the outer leaves of the plant and are finally dropped to the ground as the plant approaches maturity.

We cannot, of course, use poison of any kind upon the fully matured heads which we are to send to market (and should not use it even when the plant is half grown), but later attacks of the worms, when the plant is growing vigor-

ously, are not much to be feared; they may eat the leaves to some extent, but growth is now so rapid and strong that the actual damage is usually slight.

Pyrethrum powder and buhach, kerosene emulsion, or hot water may be used. Dr. Riley gives preference to hot water at a temperature of 130° Fahr. The water may be boiling hot when put into the watering can, but it will not be too hot when it reaches the cabbage-leaves. This treatment is practicable in the small garden only. One ounce of pyrethrum stirred into one gallon of boiling water and when cool diluted

FIG. 14.—Cabbage Aphis. Male, magnified. (*Weed.*)

to three or four gallons with cold water, makes an effective insecticide for these worms.

Professor James Fletcher suggests pyrethrum diluted with four times its weight of common flour. This mixture should be kept tightly closed in a bottle or tin can for twenty-four hours before dusting on plants.

The Cabbage Aphis (*Aphis brassicæ*).—This is one of the most troublesome insect enemies which the grower of late cabbage has to encounter. They do not appear until warm weather, and the early crop is well advanced before they become very troublesome. Throughout the summer and early

fall this pest is frequently very abundant, and we occasionally see whole fields destroyed, while damage to the extent of one-half or two-thirds of the crop is frequently sustained. These insects have a peculiar way of congregating on certain plants and leaving others in the same field entirely unmolested. It is not unusual in badly infested fields to see two or three plants entirely destroyed, while the next one to them may show no sign of damage whatever. The first frosts and the cold fall rains usually rid the plants of this insect, though some of them, in the inner folds of the leaves, which afford them protection, may be found until quite late in the season. The damage caused by the aphis must amount to thousands of dollars yearly, and it has been the subject of investigation at our various experiment stations and by our scientific men. Its history and a minute description of it may be found in many of the reports of our entomologists and in various books upon the subject, but scientific research has, as yet, failed to place in the hands of the gardener any weapon with which he can go into the fields and save his crop when it is badly infested, at a cost in time and labor which makes it worth saving.

In our experience we have never seen the plants troubled with these insects during the first two weeks of growth from the seed. It frequently happens, however, that at the time of transplanting, when the plants are about five weeks old, the lice become very abundant, and we have tried with success the following method, which we have never seen in print, but would recommend as likely to completely remove the insects for the time being. When all is ready to set out the plants, we take to the seed-bed a tub of strong tobacco water, using probably one pound to one and one-half pounds of tobacco to each gallon of water, and as the plants are taken from the bed each handful is immersed in the tub of tobacco water, and held under for a moment to allow the water to reach every portion of the plant. This will rid the plants

entirely of lice for the time being, and will not injure the plants in any way.

We have seen a number of remedies recommended in various writings upon the subject. Lime, plaster, and pyrethrum powder are advised for dusting the plants; soapsuds or kerosene emulsion for spraying (see page 39).

No doubt all these things would be good provided we could reach the insect with them by an ordinary application, but we have found great difficulty in dusting or spraying anything over the plants in the field which would prove effectual, because the insects are so completely sheltered by the leaves. It is the habit of the insect to congregate in great numbers on the lower part of the inner leaves of the plant. The leaf when so attacked does not grow much larger, but the outer edge curls up, largely covering the insects which are sapping the life out of it and affording quite effectual protection from dusting or spraying.

When completely infested the plant either dies outright or its character changes, from the fact that all subsequent growth appears to be in the stalk, which continues to grow, while the leaves show no further development. We have frequently seen the plants grow to a height of eighteen inches from the ground apparently from no other cause than a severe attack of the cabbage aphis, and as soon as it assumes this form it is useless to the gardener, as, even if the aphis could be entirely removed, it is too far gone to produce a good head.

It is quite possible that spraying might be employed with good results if the work could be done just at the proper moment, when the plants are pretty well covered with the aphis, but before the leaves have begun to curl up. To my mind the kerosene emulsion is most likely to produce the best results.

There seems to be quite a difference in the power of different varieties to withstand the attacks of the aphis, and our

observation leads us to these conclusions, which may be of some value to the reader.

The red cabbages seem most sensitive and succumb most easily; the Savoy varieties seem to be least troubled with them; the Late Flat Dutch, Drumhead, and similar strong growing varieties seem next best able to withstand their attacks; the intermediate or second early sorts come next in point of ability to resist attack, while the very early sorts are most liable to be seriously injured, of all green varieties. These conclusions have been confirmed by the observations of a number of years in which the aphis has been unusually abundant, both in the fields and among the trials of different varieties, and will, we think, be found substantially correct.

The Cabbage Maggot (*Anthomyia brassicæ*) is without question the greatest enemy we have to encounter in the growing of early cabbage and cauliflower. We will usually notice on bright, sunny days during the early part of May a small insect in size between a mosquito and common house-fly. An abundance of these insects is a sure indication that we shall be favored with plenty of maggots later on.

The egg is laid at that point where the stem of the plant breaks through the surface of the ground, and upon hatching the maggots at once find their way below the surface and attack the roots and stalk of the plant.

The first effect of these attacks is a loss of vitality, which will be quickly observed from their loss of color and sickly appearance. If the weather be dry, the damage may be limited to the loss of a small number of plants upon which the maggots have been especially numerous, and a somewhat decreased product from the balance of the field, but if we have wet weather at the time when the maggot is most numerous, their work seems to induce rotting of the stem, and the result is likely to be serious loss.

In all sections where the growing of cabbages has assumed

considerable proportions as a business or extended over any considerable period of time, the cabbage maggots are likely to prove very troublesome. They usually appear upon the young plants about the middle of May, the time of their first appearance being largely regulated by the condition of the season, and are very troublesome during the latter part of May and through almost the entire month of June, diminishing in number gradually toward the latter part of the month, and finally vanishing altogether, leaving only the evidence of their work behind them.

It should always be borne in mind that the decaying leaves left around the trenches where our cabbages have been wintered over, and all refuse of a similar character, forms an excellent breeding place for the maggots. It is important that all such refuse should be completely destroyed or buried by the plow entirely out of sight in early spring, before the appearance of the fly. Such precaution has a tendency to keep the farm free from maggots, and alternating the crops, giving as wide a berth as possible to all fields which have previously been infested, is the best means of securing exemption from the ravages of the pest.

Lime, plaster, potash salts, etc., have been recommended by various writers as likely to prove effective, but we are unable to indorse any such recommendation, as practical experience has demonstrated the uselessness of any such materials for the purpose. It may be possible that such substances would kill the maggot if we could use them in sufficient quantities, but as we have seen the maggots thrive wonderfully on ground where potash salts was used in such quantities as to kill grass and weeds, we think the cabbages would be the first to succumb.

After experimenting with everything which has given the slightest promise of relief, we have settled upon two methods which have proved most effectual in meeting the ravages of

this insect. A piece of tarred paper placed around the stem of the young plant is fairly effective in preventing the maggots from reaching the roots of the plant, and unless the maggot is unusually abundant may be relied upon to save the crop.

This piece of paper should be three or four inches in diameter, cut in octagonal shape, with a slit in one side to the center where there is a slight opening just large enough to fit closely around the stem of the plant, as shown in Fig. 15. Any blacksmith can readily make a sharp instrument of steel which will cut this paper in the desired shape with one blow from the hammer, and with such an instrument these papers can be prepared very rapidly and cheaply. Where these papers are to be applied, the ground after the usual plowing and harrowing should be rolled and made as smooth and level as possible. As soon as the plants recover from the effects of transplanting, the papers should be applied by slipping them around the stem of each plant and pressing them closely to the level ground. A workman will do this quite rapidly as soon as he becomes accustomed to the work, and the actual expense will not be found as great as may at first appear. The work must, however, be done before the eggs are laid upon the stem or it is useless, as its effectiveness is found only in preventing the maggot from reaching the root.

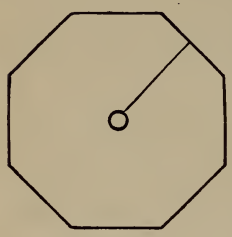

FIG. 15.

The maggots in the ground may be killed by the application of Bisulphide of Carbon. Make a small hole in the ground near the plant, and drop about a teaspoonful of the liquid into it, covering quickly with the earth to the depth of about two inches; this will evaporate quickly through the soil, and its poisonous vapor will kill the maggots for a space of a few inches around the place where it is deposited; but the

application is laborious and slow, and therefore attended with considerable expense. The experience of each reader in his own locality and with his own markets can alone determine the practical value of this remedy, but somewhat extended experiments conducted on Long Island the past summer, seem to show it the best means of killing the maggot in the ground.

The Cabbage Borer.—Until recently the ordinary observer has supposed this to be the same as the maggot, as to the naked eye it shows no great difference in appearance, but when closely examined by entomologists this has been shown to be the larva of a beetle quite different in character. The grub first appears upon the lower leaves of the plant and rapidly bores its way into the veins of the leaf and stalk of the plant, inducing what is commonly called "stem rot." The only time when the insect can be successfully killed is at that brief period when it is found upon the outside of the leaf at its juncture with the stalk, at which time spraying with Paris green will be found reasonably effectual. Poisons must not be applied, of course, when the plants are heading, but the damage from borers at that season is not serious, as the plant has then practically attained its growth. It is during the earlier period of its life that the damage from this insect is most to be feared; and at that time the plant should be closely watched for the borers, and the spraying may be done with perfect safety.

Red Spider, or Thrip (*Tetranychus telarius*), is a little insect but little larger than the point of a pin, which is frequently found in myriads on the outer leaves of the young plant, in the seed bed or in the fields, where they are sucking its life out in a manner somewhat similar to the Cabbage Aphis. For this, as for the Aphis, we can recommend spraying with kerosene emulsion as the most effectual remedy.

A kerosene emulsion is made by dissolving 2¼ pounds of

hard soap in three gallons of water, which should be heated until the soap is thoroughly dissolved; then add six gallons of kerosene oil, which should be churned thoroughly together with the solution of soap, and will then have about the consistency of thick cream. For use, dilute this with from 9 to 15 parts of water, according to the strength desired.

The Cabbage Plusia (*Plusia brassicæ*).—The parent insect is a handsome night-flying moth of a dark, smoky-gray color, with a small, silvery white spot and V-shaped mark near

FIG. 16.—Cabbage Plusia. *a*. Larva. *b*. Pupa in cocoon. *c*. Moth. (*Riley*.)

the middle of each front wing. The eggs are deposited singly or in clusters, generally on the upper surface of the leaves. The larvæ soon hatch into pale-green, translucent worms, marked with paler longitudinal stripes on the sides and back. They gnaw irregular holes in the leaves and burrow into the heads of cabbage. When full-grown the caterpillars are about two inches long. They are true span-worms, and in traveling the body assumes the looping position seen in Fig. 16.

The full-grown caterpillar spins a very thin, white, or semi-transparent cocoon, generally on the under surface of the cabbage-leaf, and transforms to pupa, shortly afterward emerging as the adult moth. In the Southern States there are several broods each season.

This pest is destroyed in vast numbers by toads and birds, and the larvæ are subject to the attacks of parasitic insects; it is also the victim of fungous disease, more especially in wet seasons.

Remedies.—The worms are very soft and tender and readily succumb to treatment with kerosene emulsions. Pyrethrum powder also kills them. It is most effectual used alone in powder or mixed with flour. (See Cabbage Worm, page 39.)

The Zebra Caterpillar (*Mamestra picta*).—In the mature stage this insect is a handsome moth with rich purplish-brown front wings. The hind legs are white, and faintly edged with brown on the upper and outer borders. The body is grayish, the head and thorax purple-brown.

The eggs are spherical and are laid in clusters on the cabbage, cauliflower, and other food plants early in summer. The larvæ when young are blackish, soon changing to light green. The young worms are gregarious, feeding together near the places where the eggs were clustered, but as they grow older disperse over the plants. When full-grown the larvæ are about two inches long, marked by broad, longitudinal, velvety-black stripes on the back, and brilliant yellow stripes upon each side, connected by fine, transverse, zebra-like lines, as seen in Fig. 17. When disturbed the worm curls up and drops to the ground.

The full-grown caterpillar forms a rude cocoon of silk and earth in the ground and changes to pupa, emerging a fortnight later as the perfect moth. Two broods are developed yearly, the second hibernating through the winter and emerging as moths in the following spring. The spring brood attacks

cabbage, cauliflower, beets, spinach, etc., and the autumn brood is often found on asters, asparagus, clover, honeysuckle, and mignonette.

Remedies.—The larvæ when young cluster together upon the leaves and are easily disposed of by hand-picking. When the caterpillars have scattered over the plants they may be destroyed by spraying with kerosene emulsion, with decoction of pyrethrum, or by dusting the plants with the powder by

FIG. 17.—Zebra Caterpillar. *a*. Larva. *b*. Moth. (*Riley.*)

means of a powder gun. Spraying with hot water also kills the worms without injury to the plants.

The Harlequin Cabbage-Bug (*Murgantia histrionica*).—This is a tropical species, said to have been introduced from Mexico into Texas, from which State it has spread over the South and as far north along the Atlantic seaboard as Delaware. It increases with extreme rapidity and is now the worst insect enemy of cruciferous plants in the Southern States. This insect derives its name from the gaudy colors

and "harlequin-like manner in which the black and orange-yellow are arranged upon the body." In the Southern States the insects live through the winter hidden under leaves and rubbish.

Dr. G. Lincecum, writing of the life history of the insect in Texas, says: "The perfect insect lives through the winter, and is ready to deposit its eggs as early as the 15th of March, or sooner, if it finds any cruciform plant large enough. They set their eggs on end in two rows, cemented together mostly on the under side of the leaf, and generally from eleven to twelve in number. In about six days in April (four days in July) there hatch out from these eggs a brood of larvæ, resembling the perfect insects, except in having no wings. This brood immediately begins the work of destruction by piercing and sucking the life-sap from the leaves, and in twelve days they have matured. They are timid and run off and hide behind the first leaf-stem, or any part of the plant that will answer the purpose. The leaf that they puncture soon wilts. * * * Half a dozen insects will kill a cabbage in a day."

f *g*

FIG. 18.—Harlequin Cabbage-Bug. *f*. Adult. *g*. Adult with wings extended. All natural size. (*Riley*.)

Remedies.—Infested fields should have clean culture, and all rubbish liable to furnish a refuge for the bugs during the winter should be burned.

Hand-picking into pans or cans containing water or kerosene oil is resorted to in the South. Pyrethrum in powder or decoction and strong kerosene emulsion may prove effectual when the bugs are young. By far the most promising method of dealing with the pest is that of Professor H. E. Weed, of the Mississippi Agricultural Experiment Station. Wild mustard, when young and tender, is preferred by the bugs even to

cabbage, and this is one of the earliest cruciferous plants to appear in spring. In 1891 Professor Weed killed the bugs upon the mustard plants with pure kerosene, but in 1892 he decided to sow mustard between the rows to be planted in cabbage. The majority of the hibernating bugs clustered upon the early mustard plants and were killed with pure kerosene; the cabbage escaped almost entirely from the depredations of the insects. We recommend this course to cabbage growers wherever the pest is troublesome. Where mustard has not been provided, try spraying with a pretty strong pyrethro-kerosene emulsion.

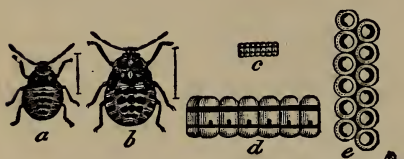

FIG. 19.—Harlequin Cabbage-Bug. *a*, *b*. Nymphs. *c*. Eggs. *d*. Eggs, side view. *e*. Eggs, view from above. *d*, *e*. Enlarged. (*Riley*.)

To make pyrethro-kerosene emulsion take of—

Kerosene oil,	1 gallon.
Hard soap,	1 pound.
Pyrethrum powder,	1 pound.
Water,	1 gallon.

Dissolve the soap as directed on p. 45.

When the soap is dissolved add the pyrethrum to the boiling solution, stir thoroughly for one or two minutes, and allow the materials to boil for about three minutes. Remove from the fire, add the kerosene, and churn until a thick emulsion is obtained. By this method a very firm pyrethro-kerosene emulsion is obtained, which, in dilution, works admirably with a force-pump and nozzle.

The Cabbage Mamestra (*Mamestra trifolii*).—The moth ranges in color from a pale yellowish-gray to a dark brownish, mottled gray. It is variable in size, resembling the Plusia moth, from which it is readily distinguished by the absence of the bright, silvery spot on the front wings. The

caterpillars vary from bright green to a brownish-green above, and are marked by a broad pink stripe on each side. Pupation takes place in an oval cavity underground.

Remedies.—Treatment the same as for the Cabbage Plusia.

Club Root (*Plasmodiophora brassicæ*).—A chapter on insect enemies is not, perhaps, precisely the place to consider a fungoid disease such as club root, but it is no part of my purpose to enter into an elaborate description of it, and I shall probably have no better opportunity to offer a few thoughts on the subject.

Every gardener knows, from his own experience, that the continued planting of all plants of the Brassica family upon the same piece of ground renders them extremely liable to this disease. Sometimes we find only small evidence of it in the enlargement of a few of the small roots at the end or some distance from the main stalk; in this event it does not affect the growth of the plant for that season, but should serve as a warning to us, for if the same ground be again planted with a similar crop failure will probably result. Occasionally we have seen the first evidence of it in the seed-bed, some of the roots showing enlargement, and have found that, by breaking off the enlarged part and removing the plants to new ground, they have suffered no damage. The theory which we have heard advanced, at times, by gardeners who seem disposed to lay most of their troubles at the seedsman's door, that this disease was due to bad seed, was disproved to our own satisfaction some years ago, when we found that the seed from cabbages badly affected when planted showed no signs of it in their product, and we believe it impossible that such a disease should be perpetuated in the seed and so handed down from one generation to another. The disease is evidently something which is first communicated to the soil from the plant, remains in the soil, and by it is communicated to the succeeding crop. We have noticed that in fields planted

upon slopes with intervening hollows, the first evidence of club-root was to be found in the low places, plants in such a position sometimes being badly affected, while those upon the higher ground were entirely free. This would appear to show that the germs of this disease were near the surface, and were washed down from the higher ground to the low places by the winter rains; it leads also to the conclusion that if the stalk and outer leaves could be promptly removed and burned as soon as the crop is harvested, we should be much less liable to damage from this disease, although the danger might not be entirely obviated. To our mind it is much more probable that the germs are communicated to the soil through the decaying of this old refuse than from the plants in a growing condition, and if this be true it is a great mistake to plow it under or allow it to remain on the surface, as it usually does. No great amount of labor is required for its removal, and the advantage of having the land entirely free from the stumps in the spring will almost compensate us for the extra work.

As in the case of the maggot, alternating the crops is the best means of avoiding club-root. When the land has become seriously affected an interval of three years will be found necessary before these crops can again be planted there with safety, and it is better to lay the land down to grass during the interval. If only slightly affected, so that we find but slight traces of the disease in the last crop, a period of two years will usually suffice.

CHAPTER VI.

EARLY CABBAGES.

Cabbage, to-day, may be found in all prominent markets the year round. The fall crop of the Northern gardener has hardly been exhausted when our cities receive the first shipments from the South, where, without danger from frost and cheap labor at hand, the industry of growing vegetables is rapidly developing. This leads to a cheapening of the vegetables to the consumer, and a shortening of the season in which the Northern gardener can command the market; and yet each section has its turn. From the extreme southern limits of the country come the first consignments, and while it is yet winter, they drive the stock carried over from the fall before to a second place in the market. But their season is a short one, for the produce of the next port to the north soon comes in in better order and secures the first choice. So it is that, as the season advances up the Atlantic coast, each section has its turn, and the most remunerative returns go to him who is first in his own particular section.

It is interesting to note the peculiar climatic influence upon different varieties, which we see illustrated among the gardeners' fields in various sections. In the extreme South the popular cabbage seems to be a late, strong-growing variety, because in a section of perpetual growth earliness of maturity does not enter into the calculation, and the vigorous growth and hardiness of the Late Flat Dutch and Drumhead sorts appear best able to withstand the intense heat. A little farther north, through Northern Florida and the cabbage-growing

sections of Georgia, we find the intermediate sorts taking the lead. These varieties are intermediate both in season of maturity and size, and, being flat, pack to better advantage than those of conical shape, such as the earliest sorts assume; but as soon as we reach a line where frost must be taken into consideration, the earliest sorts in existence are the main reliance for an early crop.

We are well up into Virginia before we see much winter protection given to the cabbage. Without doubt the system of planting in the fall and allowing the plants to stand in the field during the winter months is a good one wherever the winters are mild enough to insure success by this method. We believe, however, that this system is practiced a little farther north than is really profitable, and in many instances after a rigorous winter the plants are so badly winter killed that their growth is much retarded. Without doubt the cabbage plant will stand a good deal of frost, but continued freezing and thawing is very injurious, and we believe the cold-frame or hot-bed could be used to good advantage further south than we usually find them.

Throughout the North and Middle States the early crop is grown from seed sown in hot-beds from early in February to the middle of March, according to the location, or from seed sown usually in September and carried through the winter in cold-frames.

We think that directions for making hot-beds and cold-frames have been so frequently printed, and are so well understood by the gardening fraternity, that full descriptions here are unnecessary. A greenhouse now forms part of the equipment of many well appointed market gardens, and enables the gardener to grow his plants at any time to suit his own convenience, and under ideal conditions, as between a cold-frame and hot-bed. If we were planting one of the extra early varieties, as Early Jersey Wakefield, we should

think the cold-frame most desirable, as we find that hardier, better, and more stocky plants can be secured by this method. If planting one of the second early varieties, as Early Summer or All Head Early, however, the hot-bed is preferable, since the tendency to run to seed, which is much greater in the second early varieties, is enhanced by the long period when the plant makes little or no growth in the cold-frame. (See Notes on Varieties.) Earliness being the first consideration, they should be transplanted in the field as early as possible in the spring, and yet it is important to secure as favorable conditions of weather as we can. A strong, dry, cold, northwest wind is always to be avoided—better wait a few days until the wind changes, and under the influence of the soft, moist air from the south or east our plants will start off much more rapidly. The field should be selected the previous fall and turned over with the plow just before cold weather sets in. This is an important matter. The operation of frost seems to make such work doubly valuable, as we are enabled to work the ground earlier in the spring, and it works up in much better shape. It is always moist enough early in the spring for the plant to live provided the ground be properly prepared. After a thorough plowing and harrowing the land should be marked out thirty inches one way, to admit of horse cultivation, and eighteen inches in the row. This is a sufficient distance to secure the most perfect development of the earliest varieties, which do not make a large outside growth of leaves. If, however, the intermediate sorts be planted, the distance should be thirty-two by twenty inches, on account of their increased outside growth.

In setting the plants a good deal of care will be well repaid by after growth. It is very important that the roots of the plant should not be turned up toward the surface of the ground. The workman makes a hole with a dibber in his right hand, thrusts the roots of the plant, which he holds in

his left hand, into it, then presses the dirt firmly against the roots with the dibber. In order to secure the best results from his labor, be sure the tool you give him to work with is such that he can be expected to do the work well. The dibber which we usually see for sale is seldom large enough for good work; it should be about one and three-quarter inches in diameter at the widest part and sharp at the point, so that there may be no difficulty in making the hole for the plant wide enough and deep enough for proper setting.

We must always insist on the dirt being firmly pressed to the roots of the plant. A good rule to make with the work-

FIG. 20.—Good Dibber.

FIG. 21.—Poor Dibber.

man is that he shall so fasten the roots that the plant cannot be pulled from the ground by taking hold of the edge of the leaf, the leaf tearing away instead. A good boy can drop plants fast enough for two men to set; he should be taught to drop them convenient to the left hand of the workman, to save all unnecessary reaching on his part. It is a good plan to start the workman on a row with one extra plant in his hand, which he sets first, and, while firming the earth around this plant with his right hand, he picks up the plant which the boy has dropped at this place, which he has in his hand

ready to set at the next place. By doing this way a man can set plants a trifle faster and easier, and the extra plant is always at hand when he finds one broken or missing.

Work, from the time the plants are set in the field until they are harvested, is the essential element of success. Cultivation is not only necessary to keep the weeds down, but to secure the growth of the plant. It is only upon wet soils in excessively wet weather that there is any likelihood of our cultivating the soil too much. It is true that to secure the best results from cultivation the soil should be reasonably dry, but there are, after all, but few times when we cannot cultivate to advantage, except immediately after a rain, and we are much more liable to encounter a season when dry weather demands constant cultivation as the price of growth, than one in which excessive moisture compels us to refrain. The cultivation should be as complete and constant as possible, and, in the earlier stages of growth, the horse cultivator can be run closely to the plant without injury, but it cannot entirely take the place of hand hoeing, as some implement dealers would have us believe, as that also is necessary to loosen the soil in close proximity to the growing plant. It is advantageous to cultivate deeply early in the season, but during the later stage of growth, when the plants are large and the roots reach out in every direction, the cultivation should be comparatively shallow.

The amount of fertilizing material used on an acre of early cabbages by some of our best gardeners would astonish many of the readers of this book. One hundred dollars is frequently spread over an acre of ground before the plants are set. At the present prices it is doubtful if so great an amount of fertilizing material can be absorbed by the crop, and yet there is no danger of the average cultivator using too much. To our mind, one and one-half tons of a high-grade fertilizer is as much as the crop can make use of to advantage. This

would or should cost a little more than $50. If horse manure be used, the expenditure would probably have to be somewhat greater, varying with the facilities of the gardener for obtaining it. This article differs greatly, also, as to its manurial value, and, therefore, it is impossible to fix upon any comparative value between this and the fertilizer which we buy on an analysis.

So liberal an application as this should be made broadcast over the entire surface of the ground. I know that it is quite a common practice with many very successful gardeners to apply a part in the drill, opening a drill quite deeply, then putting in the fertilizer, and then covering the drill and setting the plants on top of the row. We have failed to note any advantage in this method, provided the application made broadcast be liberal enough. The labor of preparation is somewhat increased by it, and it is of the utmost importance that the crop be started as soon as possible. At the same time, if we were to apply but one-half a ton of fertilizer to the acre, we should put it in the drill after the manner indicated, but the best plan is to be liberal in the first investment—put it on in the most liberal way, and then we may reasonably expect a liberal return.

CHAPTER VII.

LATE CABBAGES.

The great increase made in the acreage devoted to early cabbages in the Southern States during recent years has, without doubt, shortened the area planted by our Northern gardeners. At this time the main reliance with them is the late or fall crop. From the fact that we still find a large quantity of cabbage, both in the green state and in brine, imported into this country from the old world, it would appear that the cultivation of late cabbage might still be much further extended here with profit to the American cultivator. Certain it is, that if the American farmer can profitably raise wheat, corn, and oats at the ruling prices of late years, he can well afford to raise all the cabbages which the home market demands.

Growing the plants during the hot, dry summer months is one of the first problems we have to solve; and it is often attended with so much difficulty, and failure is so frequent, that we feel inclined to devote some space to its discussion.

Any one can grow plants under favorable conditions. All we have to do is to prepare the seed-bed, sow the seed, and keep the weeds out. But what we want to know is, how to secure a plentiful supply of plants under unfavorable conditions, when the weather is so hot and dry that seed of the strongest vitality fails to germinate and all things combine to render the work difficult and uncertain. In all our experience we have found that the principal secret of success lies in being prepared, at the outset, for the worst. Any one who desires to

FIG. 22.—Watering the Rows for Seed Planting.

grow a supply of plants, either of cabbage or cauliflower, during the usual season, from May 15th to July 15th, is foolish to wait until planting time before choosing his location for a seed-bed, and then, finding his land pretty well occupied, sow his seed in some out-of-the-way corner where the chances of success are largely against him; but, foolish as such a practice is, it is very frequent.

The choice of location for a seed-bed should be made early in the spring. A small piece of ground, which has had nothing of a similar character grown upon it for several years, should be set apart. Club-root frequently appears in the seed-beds in cabbage-growing districts and renders thousands of plants unfit for transplanting; its effects, in many instances, being more disastrous in the seed-beds than in the open fields where it appears at a more advanced stage of growth. Care should, therefore, be exercised to secure a piece of ground where we are most likely to be free from such disease. We must be sure that there has been no indication of this disease in the crop which was grown on the land selected for our purpose the year previous. If we can secure a piece of ground which has been in grass for a number of years, and the year before planted with corn or some similar crop, we have all that could be desired. Where this is impossible we have simply to use our best judgment to secure immunity from the disease which usually follows continued planting of turnips, Brussel sprouts, cabbage, and plants of similar character. Our location, also, should never be upon a hillside, where heavy rains are likely to wash the soil away, nor in a narrow valley where, from the same cause, the bed is liable to be covered by the wash from neighboring slopes. The selection being made, the ground should be plowed as early in the spring as the season will permit, and finely harrowed, the harrowing to be repeated as frequently as is necessary to keep the land clean until the time we desire to employ it as a seed-

bed. Where such preparation has been made we shall find that, if we are compelled to sow seed in dry weather, we have retained all the moisture which is possible in our seed-bed, and if the weather is wet, we have at hand a piece of ground which works up freely and in good condition.

Where this method is followed there are few occasions when the seed on such a piece of ground will not germinate freely, provided the soil be properly firmed on the seed when planted in dry weather. The late Peter Henderson wrote an article, years ago, upon "The Use of the Feet in Seed-Sowing," which was widely published at the time and contained a valuable suggestion. His recommendation was simply to pass over the row, after sowing the seed, with your full weight resting on the ball of your foot, thus giving the full weight of a man on every inch of the row and firmly pressing the soil upon the seed. Where the ground is dry, or very liable to become so, it seems impossible for a man to press the soil so firmly on the seed as to do injury; but such a method is both unnecessary and unwise when the ground is wet. The question of its advisability under all cases is one which the judg-

FIG. 23.—Planting the Seed Bed.

ment and experience of the gardener should be competent to decide.

There are times, however, when the ground becomes so hot and dry that the requisite moisture for the germination of the seed must be supplied by artificial means, and it is important that the work be done in a manner to secure success. It is almost useless to undertake to sprinkle water over a seed-bed of any considerable size, and we have found the following method best suited to the purpose. As soon as the ground is prepared, rows fourteen inches apart and about two inches deep are marked in the soft, fine earth (Fig. 22); then, with the ordinary watering-pot, from which the sprinkler has been removed, a man walks slowly along, filling the rows with water, which is allowed to settle away and will wet the dirt thoroughly for three inches below the bottom of the row (Fig. 22). The seed may then be planted in the rows so watered and covered by raking the drier earth over it. Press the earth gently upon the seed, and we shall have moisture enough not only to insure germination but to provide also for the early growth of the plant (Fig. 23).

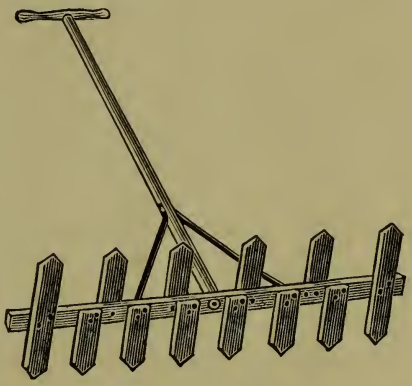

FIG. 24.—Marker.

In the event of a hard shower soon after the seed is sowed it is best to rake the top of the ground as lightly as it can be done and still make the work effectual, in order to break the hard crust which would otherwise form and possibly make it difficult for the plant germ to break through. This work can

be done at any time until the plants are beginning to prick through the ground, after which it is liable to injure them. Where these directions are followed it should be easy to secure the required number of plants. We have not found it necessary to water the bed after the seed is up, even in our driest seasons, but frequent stirring of the soil between the rows promotes growth.

Late cabbages, in most of our market gardens, are planted as a second crop. They can, with advantage, be made to follow early potatoes, peas, etc.,—in fact, anything which can be marketed by the fifteenth of July will give time for a crop of late cabbage in the latitude of New York City. Many acres are planted on farms which are not yet given over entirely to market gardening, upon grass land which has produced a crop of hay, and such a piece of ground is an excellent location in a season when we have an abundance of rain. In a dry summer, however, it is not advisable, as the growing grass has already absorbed what little moisture the soil possessed, and sod turned over in a dry summer is the driest of all dry places. In such a season the best results will be obtained by following one of the spring crops, or, if we have an abundance of land, select the proper field in the spring and allow it to remain unoccupied during the early season. Such a piece of ground should be plowed early in the spring and harrowed at intervals until required for planting, and where so treated is, without doubt, the best place obtainable for planting late cabbages.

It is not necessary to force the growth of late cabbages to the same extent that we do the early crop, and therefore the amount of fertilizer required is not usually as large, an application of from 1500 to 2000 pounds of a complete high-grade fertilizer being sufficient, on reasonably good soil, to secure excellent crops. To our mind, about 2000 pounds should be spread broadcast over an acre, as evenly as possible, as soon as the ground is plowed, and harrowed in.

The season for planting depends almost entirely upon the variety and the conditions of the season in the locality of the grower. Upon Long Island we find that we can secure fall crops of the late, large-growing varieties, such as the various strains of Late Flat Dutch and Drumhead, by planting about July 15th; of such sorts as All Seasons, Fottler's Brunswick, Louisville Drumhead, etc., by planting about July 25th; while Henderson's Succession, Early Flat Dutch, Burpee's Allhead Early, Early Summer, etc., may be planted as late as August 1st. The experience of the grower in his own locality with different varieties will readily show him what to plant and when to plant it.

As the season approaches for setting out the crop we should have our ground plowed, fertilized, and thoroughly harrowed, ready to take advantage of the first shower; but at the same time we think that one of the best rules a man can make, both in regard to cabbages and cauliflowers, is never to wait for rain. It is true that the extra labor of setting the plants with water means extra expense, but, in most instances, it proves a valuable investment. It is always best to choose a time when southerly breezes and a moist atmosphere will enable the plant to rally during the night from the trying effects of necessary exposure to the sun.

A good rule to adopt in regard to setting plants is this: Whenever the ground is moist enough to enable a man to thrust a dibber into the earth and withdraw it, leaving a hole which is not filled at once with dry dirt, there is sufficient moisture for setting plants in reasonably favorable weather without the use of water. It is best, however, in setting plants at any time, except immediately after a rain, to loosen them in the seed-bed with a pitchfork before pulling them, and, when pulled, take them in large handfuls and dip the roots in a pail of water, thoroughly wetting the earth which clings to the roots. We have found this of great advantage,

and the extra work is so trifling that we think it best to do this under all circumstances. Whenever there is so little moisture in the earth that it will not pack sufficiently, but fills the hole left by the dibber at once with dry dirt, a plant cannot be expected to live, and we must resort to the use of water.

As soon as the ground is prepared and marked out, a man, with a heavy stick about four or five feet long, 2½ inches in diameter, makes a hole in each planting place. He is followed by another man who fills each hole with water, usually putting about half a pint at each place, which is sufficient; this is allowed to settle away, which it does rapidly in the dry earth, and then the plants can be set in their proper place with every prospect of success. This gives them all the advantages of a good rain, and as we can usually pick out such weather as we want for setting them, we have found a great advantage in this method over setting after a rain which cleared off with high northwesterly winds or a burning sun.

To those who have never tried it the extra work may seem a serious hindrance, but two or three men will make rapid progress, and we do not think that the labor of transplanting is increased by this means more than one-third. We will find the employment of this extra labor much better than to allow the proper planting season to slip by while waiting for rain.

The same thorough cultivation required by early cabbages is necessary to the late crop also, although it is hardly necessary to carry it so far toward maturity in the fall of the year as in the summer months.

It is a busy time on the farm or market garden when we are called upon to harvest the crop. Shortening days and frosty mornings advise us of a fast approaching winter, and all our energies are directed to securing the season's crops. We are not compelled to market our crop of late cabbages immediately at maturity, as is the case with the early crop. During

the cool weather of the fall they can be held for a favorable turn in the market, and, if necessary, even carried over the winter. It is, however, advisable, with this crop, as with every other, to market direct from the field whenever it can be done at remunerative prices.

Barrels are principally used for transportation and should be packed as closely as possible ; loose packing, for the sake of increasing the number of barrels, is very expensive, as all produce so packed arrives in poor shape and sells at lower prices. Equally expensive, in the long run, is a somewhat common practice of putting poor truck in the bottom of the barrel and only good heads on top. The mark of a man who adopts such tactics soon becomes known to intending purchasers, and his goods are either avoided or heavily discounted.

If the goods are consigned for sale to some commission dealer—the common practice with all growers living at a distance from the market,—it is best that you should become pretty well acquainted with your man ; investigate his facilities for disposing of your crops ; satisfy yourself, so far as possible, of his financial responsibility and business integrity ; then see that he has the goods in the best possible condition, and you may expect the best prices which the market affords.

A man's name on a barrel usually indicates the quality of the goods it contains. If a man has been in the habit of putting up good stock in good shape and culling out the poor truck to be sold as such, his name on the package is a guarantee of quality and his goods find ready sale, while those of doubtful character go begging.

These facts must be apparent to every one who takes the trouble to think it over, and have been preached by writers on the subject for years, and yet it still seems that a large portion of the produce sent to our markets must be put up with the idea that some one is going to be fooled into buying poor stuff for good.

When they are grown in large quantities, cabbages may, by special arrangement, be sent loose in car-load lots, and such transportation brings them to market in good shape at much less cost for freight, which is no inconsiderable item on produce so bulky. When so carried, however, it is necessary that the weather be cool, the transportation company reasonably prompt, and the cabbages dry when loaded; otherwise they may be liable to heat and reach the dealer in bad shape.

CHAPTER VIII.

STORING FOR WINTER.

For early winter sales they may be taken up with the roots on and stored in well-ventilated cellars, where they will keep till midwinter, or they may be stacked in some sheltered position about the barn, placing one above another in tiers, with the roots inside, and covering them deeply with sea-weed, or,

FIG. 25.

if this cannot be procured, something like corn stalks (Fig. 25) may be used to keep them from the weather as much as possible. When so stored they may be obtained at any time during the early winter when the market is favorable.

When it is desired to keep them until spring, we must bury

them in the ground, and two methods are in common use. Our market gardeners very largely stick to the old way of turning them over and setting them flat on the ground in long rows with the roots up, and then, with plow and shovel, covering the heads with earth to a depth of three or four inches, leaving the root exposed at the top of the ridge. In this way they usually keep fairly well (Fig. 26), but we have frequently found considerable rot at the juncture of the stalk with the head, and we think that the root protruding through

FIG. 26.

the top of the ridge allows the water from our winter rains to enter and settle around this point, which leads to decay. Certain it is that they will not keep as well until late in the spring, and do not, as a rule, come out as fresh as when buried after the method of seed growers, which will probably be new to most of our readers.

A cabbage plow is first used to lift them, running close to the side and under the plant. This merely loosens them and admits of our taking them up with a good ball of earth, with-

out tearing the roots. One row in every five (if the cabbage be large), is now taken up and laid one side, and in the space so made clear, with a large plow, we make a trench as deep as possible, going and returning in the same furrow. The cabbages are then placed along each side, and one man standing in the trench packs them as closely as possible with the roots down in the bottom. He moves slowly backward as the work progresses, and, by packing at a slight angle, is able to make better work than by trying to put them in perpendicularly. Where the heads are large, two heads are placed abreast in the trench, and, if closely stowed, one trench will hold five rows of the same length.

FIG. 27.

After stowing them away in this manner, a little straw or similar material (Fig. 27) may be used directly over the heads to keep them clean, but should not be put on deeply with the idea of protection, and the trench then covered by plowing three heavy furrows upon it from each side and completing the ridge so made with a shovel, the whole being covered to a depth of six to eight inches.

This method affords the most complete protection of any of which we have knowledge. It is not only a good way to bury large, full-grown heads for the winter, but smaller, immature heads, not sufficiently developed to be saleable in

the fall, will grow and mature in the trenches and come out in the spring in condition for the market. The labor of burying in this way is not greater than by the method first described, and we know of but one disadvantage which would attend its general use; on account of the deeper covering of earth we could not as readily break into the trenches in early spring, as we sometimes do, when considerable frost is encountered. For this reason it might be well to use both methods to some extent, burying the most mature stock for earliest sales by that first described, and using the second for the more immature stock. This would, of course, increase the labor of burying to some extent, but might enable us to catch a favorable turn in the early spring market.

CHAPTER IX.

EARLY CAULIFLOWERS.

Having given in detail our ideas on the cultivation of early cabbages, it is not necessary that we should enter so minutely into the cultivation of early cauliflowers, as the methods applying to the former crop may largely be made applicable to the latter. The cauliflower plant, however, is not as hardy as the cabbage; the extremes of heat and cold work more to its injury; it is rather more sensitive to excessively dry weather, and excessively wet weather at the season of maturity, if the temperature is high, will often result in the destruction of the entire crop.

There is probably no crop pertaining to the market garden where the road to success leads over so many obstacles as in the cultivation of early cauliflowers, and yet, where a fine crop is secured, the profits are usually very satisfactory.

In growing the plants and in the general cultivation of the crop the methods given for early cabbages will be found to apply to early cauliflowers, but the plants will not bear as close planting; two by three feet gives none too much space for the earliest varieties. Overcrowding is not profitable in growing this crop, as it decreases the size of the heads, and we have found it much better to allow the plant plenty of room to reach the highest stage of development.

In regard to the fertilizing of early cauliflowers we certainly should not plant them unless our ground has been first highly manured. All our experience shows that it is extremely difficult to secure the finest heads of cauliflowers during the

warm weather of early summer, when we are to market the crop, and success is hardly to be expected unless we can secure a strong, vigorous growth of plant. In this respect we think it differs somewhat from early cabbage. The cabbage plant will stand some neglect, and while, like everything else, it rewards the best treatment with the best returns, it usually returns *something* even where indifferently treated, but early cauliflowers require both liberal manuring and thorough cultivation to promote growth and secure satisfactory results, and unless these essentials are supplied, the result is pretty likely to be complete failure and consequent loss of time and money.

In considering the advisability of planting early cauliflowers, we must look first at our facilities for marketing the crop. As the harvesting season is in warm weather it will not stand long carriage in close freight cars and arrive in market in the best of shape. If our situation is such that the crop cannot be driven direct to the market from the field, it is best to make arrangements with some express company to secure the prompt delivery of the goods. By combining together, a number of truckers ought to be able to secure satisfactory rates by express as well as good and prompt service. It is quite necessary that produce of this character should be on sale early in the morning of the day following that on which it is taken from the growing field. If we can secure such arrangements as will enable us to cut our cauliflowers in the afternoon and have them reach market the following morning in time for the earliest sales, we need nothing better so far as transportation is concerned. Full directions for harvesting by the most convenient method, as well as preparing and packing for market, will be found in the chapter on Late Cauliflower, and are therefore unnecessary here.

A number of writers have advised cutting cauliflowers while wet with dew in the morning, but we think such a plan is en-

tirely wrong. As is well known, all such produce is placed on sale in all our large markets very early in the morning, usually from two to four o'clock, and to make these sales our produce must of necessity be cut the day before. Cutting in the morning, therefore, simply lengthens the time between the field and the market. We have also noted very injurious effects from packing cauliflowers when wet, as they are very liable to heat and rot, particularly in warm weather, and, we believe, should be as dry as possible when packed for transportation.

It is quite true that the growing of this crop is attended with considerable risk, and yet we believe that the business is capable of great development.

We have not noted the difficulties which stand in the way of success with any idea of discouraging the prospective cultivator, but because we believe that by looking intelligently at these obstacles we may become fully prepared for them and the more likely to achieve success.

At the ruling prices of the present time early cauliflowers should be one of the most profitable crops of the market garden. Increased supply would, without doubt, lead to increased consumption, and greater experience under our own local conditions should lead to a lessening of the cost of production and the attainment of the most satisfactory results.

CHAPTER X.

LATE CAULIFLOWER.

Upon Eastern Long Island, where this plant is cultivated more extensively than upon any similar area in the United States, the cauliflower season is a long one, and sowing the seed begins about as early as it can safely be put in the ground in the spring and continues at intervals until the latter part of June.

We use the term "late cauliflower," not because the crop of which we are speaking is necessarily planted late, but to distinguish the main crop, where the seed is planted in the open ground during spring or early summer, from the early crop, where it is sowed the fall previous or under glass in the winter time.

Continued plantings are advisable, as they extend the time of transplanting and enable us to avoid a rush of work at this season, and also, by lengthening the time in which the crop must be marketed, we are enabled to take care of the crop properly and avoid, so far as possible, the glutting of the market which always attends the heaviest shipments.

Having entered pretty fully on the growing of plants in the chapter on Late Cabbages, further detail here would be superfluous. We have only to bear in mind the fact that we rarely obtain seed of cauliflower which has as strong germinative power as that of cabbage, and that the plant when young is more sensitive to unfavorable conditions, and, therefore, must not be neglected in the slightest degree during the early stage of growth.

Late cauliflowers are frequently grown as a second crop in the same manner as late cabbages, but, unless our operations are confined to a very limited area, we do not consider it advisable. The latter plantings could be made to advantage after such a crop as early peas, where we would be enabled to give the land two plowings in the interval between harvesting the first crop and planting the second; but, as a rule, the best results are obtained by those who save the ground for this crop early in the spring, plowing it at that time and harrowing at intervals until required.

The season for transplanting in the field begins in this section (Eastern Long Island) about June 15th and continues until the early part of August. To secure plants for setting as early as June 15th the seed must be planted by May 1st, as fully six weeks are required to bring them to the proper size at this season of the year. Later on, when the weather and ground have become warmer, we find they reach the proper stage more quickly, and for seed sown in the month of June a period of five weeks is probably a sufficient length of time to allow.

Right here let me say that it is never good policy to set the plants too small. They should have a good, strong, stocky growth, and will be more hardy and live better in an unfavorable time if the growth has been moderately slow in the seed-bed than if it has been rapid. They should not, however, be allowed to remain too long in the seed-bed, as, unless they are very thin, the stem will become long and crooked. As soon as the largest of them has attained a height of about six inches, they should be taken out, leaving all the smaller ones for a later setting. We find that removing the largest plants from the bed gives more room to those remaining and disturbs their growth somewhat, so that it is not so rapid from this time forward; but on this account it is hardier, and many market gardeners prefer the second pulling. The apparent

stunting of the plants from pulling out a part of them, and so disturbing their roots, seems to have no effect upon their future growth in the field; they do not scald as badly when first set out, and as soon as they recover from the first effects of transplanting will appear to go forward just as well. I think, however, that it would be easy to carry this line of reasoning too far. I certainly should not care to set plants which had been standing still for four or five weeks in the bed, although I believe that within reasonable bounds the reasoning is good.

It is never best to crowd cauliflowers in the field. Give them plenty of room, and you may expect a full development. The Dwarf Erfurt varieties are frequently planted about two feet apart in the row, and the space between rows is usually three feet. To my mind it would be better to plant them $2\frac{1}{2} \times 3$ feet, which will admit of horse cultivation each way when the plants are small, and, with most of us, the saving of labor on a field of any considerable size will compensate for the use of a little more ground, and we may, with reason, expect the plants to do better at this distance. The larger strains of Erfurt should be planted $3 \times 3\frac{1}{2}$ feet, and the Large Algiers and similar strong-growing sorts should be planted $3\frac{1}{2}$ feet each way.

Cauliflowers require fully as much fertilizer and fully as much cultivation as cabbages. We have already gone as fully into these questions as seems necessary, and only pause here to say that wherever we go we notice that the best success attends the efforts of him who treats his crop the best.

The main crop of cauliflowers fully supplies our markets from August to January. In about eight weeks, if the season has been favorable and growth rapid, we shall find our early June setting beginning to make heads, and the long season of harvesting is at hand. Much depends upon the weather for the earliest plantings; if we can have it reasonably cool in the month of August we may expect good heads, but if hot,

the heads are very likely to grow leafy—that is, with small leaves protruding from each intersection—or develop some of the other peculiarities which frequently lead old growers to say that "you never know what they are going to do until you see them head."

Excessive humidity in the atmosphere frequently develops a disease of the stalk called "stem-rot," which sometimes destroys whole fields and for which we have no known remedy; but if the weather be cool during August, with occasionally a cool rain to keep them coming along, we may expect to see the care and labor which have been given to these plants rewarded, and well rewarded, too, for one good barrel now will be worth as much as two or three later on when we're crowding every market to get them out of the way.

As soon as the heads attain a size of about five inches in diameter, they must be covered in such a manner as to shade them from the sun and protect them, as much as possible, from all wind and rain. This is work which requires care, judgment, and experience, but when fully understood is accomplished rapidly. It is the usual custom, especially among large growers, to cut the cauliflowers by a certain mark made when the head is so covered, and it is necessary, therefore, that in covering the heads the work be done intelligently, so that they may reach the proper stage of maturity for market at a given time.

The work is usually accomplished after the following manner: As soon as the plants begin to head, a man, carrying in his left hand a small bundle of rye straw, will pass down between two rows, closely observing the plants on each side of him; presently he sees one which, in his judgment, can no longer be left exposed to the elements without injury, when, taking a few straws in his right hand, he doubles them, making a short band, then, passing both arms completely around the outer leaves, he draws them together to the center above

the head and ties them securely around the top. This process is called tying up.

Two or three days later, according to the weather and the rapidity with which the plants are heading, they will again require attention. This time we pass over the field as before, taking two rows at a time, but using small wooden pins. We lap the leaves loosely one over the other all around the head and fasten the upper ones securely with the pin. This is calling pinning up.

Again, in two or three days we shall find the number of

FIG. 28.—Cauliflower Plant Tied Up.

FIG. 29.—Cauliflower Plant Pinned Up.

heading plants increasing, and this time we pass over the field with nothing in our hands. When we find a head of the proper size we simply lap one leaf over another, until we have secured the required protection, then tuck the end of the upper leaf under the one below it, forming, with these outer leaves, half of a knot. This is called tucking.

We now have in the field three distinct marks upon the plants which are heading; our first mark, those covered by means of straw bands, is a week old, and those heads are

ready to cut. This is done at that stage of growth when the head has attained its full size but still retains its solidity. If allowed to remain longer, growth continues, but the head, instead of remaining solid, "bursts," or branches out into the next stage of development, which, fully carried out, would produce first the blossom, then the seed. By looking closely at the outer edge of the fully matured head, we shall see the first indication of this condition; the head is beginning to burst and all further growth in size will be at the expense of its solidity. It is now in the best condition for market and should at once be cut. Had it not been for the different methods we have adopted in covering the heads, we should now be compelled to part the leaves and look closely at each one which has been covered, but if the work of covering has been properly done, all this extra labor is obviated; we simply cut the first mark, those tied up with straw, and leave all others for future cutting; then, having removed the first lot tied with straw, we use this mark again for covering the heads, cutting next time those which are pinned up, and so the work continues.

FIG. 30.—Cauliflower Plant Tucked Up.

If inexperienced men are intrusted with the work of covering the heads, loss is likely to result from its being improperly done unless they are thoroughly instructed. The leaves must not be bound tightly across it when half grown, as it usually is at this time that the head requires room for further development, and there must be some air space above it to prevent rotting in hot, moist weather. It is, therefore,

FIG. 31.—Harvesting Cauliflower.

necessary in covering that as much space as possible be left for the head, but at the same time the leaves should be securely fastened so that there be no danger of the wind blowing them apart.

In harvesting the crop two methods are in common use: In some instances the heads are cut off below the lower leaf, loaded upon a wagon, and taken to the farm buildings, where they are trimmed and packed in barrels for the market. In others, the barrels are taken to the field and placed along each end of the lot at convenient distances, the workman carrying a large basket, cutting and trimming the heads as he goes along, and packing in the barrels in the field. This latter method has the advantage of saving labor, as there is less handling and the useless leaves are left in the field, where they can be plowed under as soon as the crop is removed. It is not advisable, however, to pack them for any length of time before shipping, or when they are wet, and this method cannot, therefore, be practiced except in dry weather or when immediate shipment from the field is to be made.

A little practice renders a man quite expert in cutting and trimming and capable of accomplishing a great deal of work. With a heavy knife in his right hand he severs the stalk at one blow just above the ground; then, lifting the head with his left hand, another blow cuts closer to the head at the proper place to leave a few outer leaves encircling the head; he now holds the head upright upon his left hand and cuts the leaves off neatly at a level with the head all round (Fig. 31). The next operation consists of picking out the few short leaves which grow close to the head and cannot well be reached by the knife, and, as is usually the case, covering the head with white tea paper, or "papering," as it is called.

When there is such a rush of cauliflower in the market that every commission merchant's stand overflows and covers half the street, papering rarely pays. We then get but little for

the goods, and extra work in putting them up seemingly goes for nothing; but whenever there is a good or even a fair market, it is best to paper the good heads, which simply consists of covering them with a sheet of paper, the edges of which are tucked in between the head and outer leaves. When put up in this way they will usually arrive at the market in better shape and present a better appearance on the stand, which ought to result in an increased price. Whether papered or not, the poor heads should be culled out from the good ones, which should be put up separately and marked, the usual custom being to mark XX across the top of all good barrels, and in case they are papered the letter P is frequently put on. A salesman soon learns what to expect from these marks, and, if the work be honestly done and the grade kept up to a high standard, will soon be able to establish a good trade on your particular brand. The culls should be put up separately, marked as such, and sold for what they will bring.

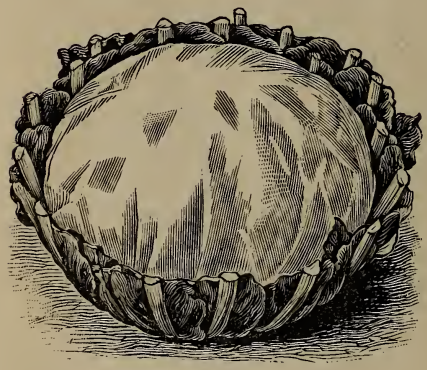

FIG. 32.—"Papered" Head of Cauliflower.

There can be no question but that a great deal of money is lost by improper packing; in the first place, it is never good policy to pack good cauliflowers in poor barrels which will hardly hold together to reach market. Good cauliflowers are always worthy of a good barrel, and will command a better price from one end of the season to the other, if well put up.

Beginning at the bottom, the heads are packed in layers one

above the other, until the barrel is filled to the top (Fig. 33), then rounded up by placing a few heads face downward upon the top. They should be packed, so far as possible, upon the side, care being taken to so place them in the barrel that the stump of the head cannot crush into and bruise the head below through the necessary jar incidental to transportation.

FIG. 33.—Packing for Market.

They should be packed as closely as possible in the barrel, and the cover, which is of burlap or any kind of bagging, is drawn tightly over the heads in the following manner: Remove first the top hoop, spread the cover over the head of the barrel, place the hoop over it, and fasten it in place on one side; then the workman, leaning his chest directly upon the top of

the heads, allows a good share of his weight to rest upon them, pressing them down closely, and, drawing the cover as tightly as possible upon the opposite side of the barrel, drives the hoop in place and nails it fast. At first thought, some of my readers may imagine that the weight of the man will crush the heads, but, if properly packed, this is just the means to prevent it. (Fig. 34.)

The barrels are usually loaded in freight cars, one above another, and unless packed so closely that each head will keep

Improperly Put Up. Properly Put Up.

FIG. 34.—Ready for Market.

its place throughout the journey, the jar and the rough handling always to be expected from the employees of transportation companies will bring it into market in bad shape.

In hot weather the barrels should be ventilated by cutting holes in the staves; but when the weather grows cool we prefer tight barrels, a sufficient circulation of air being provided for by the covers. Experience shows that nothing will cause them to wilt so badly as a cold, dry wind, which can be prevented from reaching them by the tight barrels.

In times when the market is overloaded by an excessive supply, and prices are forced down to a point which leaves very little margin over transportation and selling charges, cauliflowers are sold largely to pickling concerns, who purchase the heads by weight, and load them in freight cars or store them in salting-houses, which are established at convenient points. For this purpose the heads are not trimmed as for market, but cut out entirely from the plant, with no outside leaves attached.

The prices paid by pickling men are always very low, but disposing of a considerable portion of the crop in this way affords relief to the over-stocked market, and secures better prices for those marketed, while at the same time it demands much less work in harvesting, all the labor of trimming and packing being unnecessary.

In the village from which we write, a salting-house has been established by the efforts of the farmers themselves, they owning the building jointly and leasing it to a pickling company. Into this building hundreds of tons of cauliflowers are rushed every year at a time when the market is so glutted that remunerative prices are an impossibility, and some such outlet as this forms the only means of disposing of the surplus stock.

As the pickling companies always take advantage of the condition of the market in making their purchases, it would appear to us that the co-operative idea might be carried still further in any community where the industry of growing cauliflowers had assumed such proportions as to make it desirable; the growers not only building and owning the salting-house and its equipment, as in the present case, but owning and putting in the stock upon some equitable plan to be agreed upon among themselves. In the following winter or spring this stock could, without doubt, be marketed at a price much more in keeping with its actual value, and the grower would

not be forced to the unfortunate position in which we very frequently find him, that of being, from stress of circumstances, compelled to accept whatever price the buyer is pleased to offer.

Canning cauliflowers cannot, as yet, be said to have passed beyond the experimental stage. For several years past a limited quantity has been put up by Long Island canners, who say that they find no difficulty in canning the goods, which is not attended with excessive cost, but that the article is not yet known in our markets and has not established a reputation which would lead to extended sales. As this vegetable can be produced and put up in cans at a price which will place it on a level with tomatoes, green corn, and other vegetables which are now canned in immense quantities, it is quite probable that the business may assume much greater proportions in the near future, thereby enabling the consumer to secure a supply of this most excellent vegetable at all seasons and providing for the grower another outlet for his product in times of overstocked markets.

Whenever the approach of cold weather finds us with any considerable quantity of cauliflowers in the field not yet mature enough for market, we find that we can save them by taking them up with as much earth attached to the roots as possible and storing them in some place where hard frosts will not be felt, and they will have a chance to grow and develop during the warm days of early winter. Where a well-ventilated cellar is at hand it makes an excellent place for the purpose. It is never best to wait too long and allow the plants to be injured by freezing, but, as the season becomes so far advanced that severe weather may be daily expected, it is best to bring all those having small heads formed, but which in the natural course of growth could not become mature for two weeks or more at this late season, to the cellar where they are to be stored, standing each plant upon its roots and placing them

as closely together as they can be packed; cutting off the tops of the leaves makes closer storage possible and lessens the liability to heat. They cannot be placed in heaps or one above another without injury. If given plenty of air on warm days they will keep for several weeks and the small heads will grow to a good size.

If we have no cellar room for this purpose a place for storage can be improvised on the southern exposure of some hillside, which may be dug away sufficiently to afford good protection, and covered with a temporary roof made by placing corn-stalks or other coarse litter upon poles, the ends and sides being covered in the same way where necessary. Cauliflowers stored in such places, and when protected in sheds or other out-buildings, may be kept well into the winter until the fields are covered with ice and snow and the market relieved of the excessive supplies of the fall months; then, during the holiday season, very satisfactory prices may be realized.

In the open field cauliflowers will stand a temperature of 24° F. without injury, and even 20° F. will do little damage if it be not long continued. Full-grown heads are much more liable to be damaged by frost than the small ones, and it is best to keep the field cut closely and the small heads well tied up when hard frosts are to be expected. If they become severely frozen in the field and we have reason to believe that warm weather is soon to follow, it is best to allow them to remain in the field until thawed out, as injury is much more likely to result if cut when frozen.

Extended experience in the cultivation of any given crop should always lead to the most advanced methods. Necessity has in many instances led to the adoption of devices, simple in themselves, but of great value in the cultivation of the soil. One of the best markers (Fig. 35) I ever saw is in common use in this section, but as we have not seen it in other

places and have no knowledge of a printed description of it, we will describe it briefly.

The frame consists merely of two two by four inch yellow pine timbers, eight feet four inches in length; these timbers pass through three runners, through which mortises have been made, the central one being fastened firmly in its place, exactly in the center of the timbers. Holes are bored in the

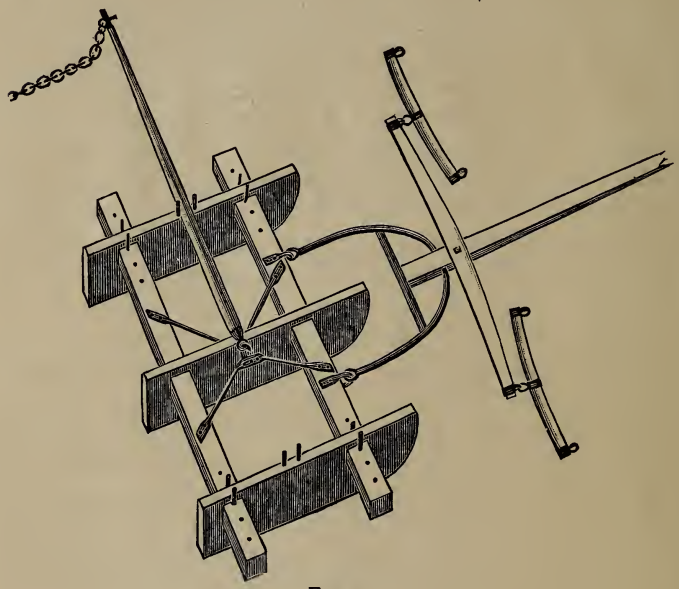

FIG. 35.

timbers at the outer ends, and the outside runners are moved to any desired distance from the center and held in place by wooden pins. A pole is fastened at one end to the central runner, but so arranged that it can be swung from one side to the other; to this a chain is attached at the proper distance from the row to serve as a guide for our driving on the return.

The pole by which the marker is drawn is fastened firmly to one of the timbers, which are braced from the central runner. The runners are made of two by eight-inch timber and will last longer if shod with iron. If a deep mark is required, the driver rides, but for setting plants the mark will be deep enough without his weight. In driving, the pole between the horses is each time kept directly over the guide mark made by the chain. Three rows are marked each time,

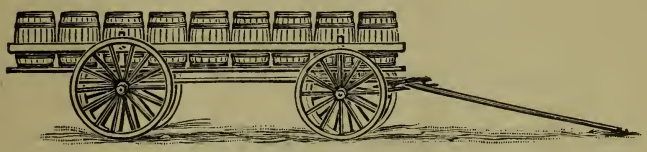

FIG. 36.

and the distance between the rows is varied, as required, from 2½ to 4 feet.

A very convenient arrangement for carrying barrels of garden truck upon the ordinary farm wagon is made by taking off the box, lengthening the reach, using long planks for the bottom, and fastening a long 1½ inch plank, about five inches wide, on each side outside the stud-staffs, by means of heavy staples. This secures both greater width and length, and will double the carrying capacity of the wagon.

CHAPTER XI.

PROFIT AND LOSS.

I should be stepping far out of the path which writers upon similar subjects have chosen if I did not close with an elaborate showing of the profits to be expected in dollars and cents. I approach this subject with a full realization of the fact that the value of any previous calculation of profits upon the crops of farm or garden is exceedingly problematical. To all of us it must be apparent that the merchant or manufacturer can calculate the cost of his goods with a certainty which is an impossibility to the cultivator of the soil. Who can tell the cost of cultivating a crop when so much depends upon the effect of rain or sunshine? Who can discount, in proper measure, the ravages of insect enemies, which we are powerless to resist? Who can foretell the condition of the market at that particular time when our goods must be marketed?

But notwithstanding the element of uncertainty which enters into every calculation of the tiller of the soil, we believe that some estimate of the cost of growing every crop should first be made before we actually begin the work of growing it; then, knowing the probable cost of our produce, and knowing as well the probabilities and possibilities of the market in which we are to sell the goods, we should be able to judge intelligently of the advisability of their cultivation.

ESTIMATED COST PER ACRE OF A CROP OF EARLY CABBAGE.

Growing and wintering 11,500 plants,	$22
Rent of land,	10
Manure or fertilizer, including application,	50
Plowing, harrowing, and marking,	8
Setting plants,	4
Cultivating, hoeing, etc.,	12
Harvesting and preparing for market,	15
Total expense,	$121

To enable us to understand this estimate more fully we might look at it a little more in detail. The first item, placing the cost of 11,500 plants at $22, should be sufficient to cover the cost of seed, growing and wintering the plants, which, with most gardeners, should range from $1.50 to $2 per thousand. Our liberality in the next estimate, of $10 for the use of one acre, would depend upon the situation of the grower; if located where land is very valuable this estimate is not high enough, but it should be borne in mind that this land is not occupied during the entire season, the cabbage being removed in ample time to admit of the planting of some fall crop; this estimate is, therefore, more liberal than would at first appear. The estimate for fertilizers will admit of liberal treatment, and so will the items following, which cover the labor of securing the crop. Our estimate for harvesting and preparing for market does not include the expense of transportation and making sales, but is intended only to cover the cost of harvesting and preparing for market upon the farm.

If the estimates be correct, we find that we can grow an acre of early cabbages for $121. It is but fair to allow 10 per cent. or more for loss from various causes, but under reasonably favorable conditions we ought to secure 10,000 heads from the 11,500 plants set; the cost of 10,000 heads being $121, would be 1.21, or, to make still further allowance for

possibilities, say 1¼, cents each. By adding an allowance for freight and commission and crediting our crop with 10,000 heads, at such prices as we frequently find in market quotations, we might be able to figure out a very handsome profit on the acre; but we think best to leave this part of the calculation to each individual reader. Knowing that he can reasonably expect to grow early cabbages at about 1¼ cents a head, and knowing his own transportation facilities and the possibilities of his own market, he should be able to figure for himself, much better than any one can figure for him, the profit he could reasonably expect.

ESTIMATE OF THE COST OF AN ACRE OF EARLY CAULIFLOWERS.

Growing and wintering 7300 plants,	$15
Manure or fertilizer, including application,	60
Rent of land,	10
Plowing, harrowing, and marking,	8
Setting plants,	3
Cultivating, hoeing, etc.,	10
Harvesting and preparing for market,	25
Total expense,	$131
Estimated product of 1 acre of early cauliflowers,	110 barrels
Cost, per barrel, on farm ready for shipment,	$1.19

ESTIMATED COST OF GROWING ONE ACRE OF LATE CABBAGES.

Rent of land,	$10
Fertilizer,	35
Plowing, harrowing, etc.,	8
Growing 8000 plants, including seed,	8
Setting plants,	3
Cultivating, hoeing, etc.,	10
Harvesting and preparing for market,	12
Total cost,	$86

Allowing liberally for possible contingencies, we ought to secure, with such treatment, at least 7000 heads from 8000 plants, which makes the cost per head 1$\frac{6}{70}$ cents.

ESTIMATED COST OF ONE ACRE OF LATE CAULIFLOWERS.

Rent of land,	$10
Fertilizer,	35
Plowing, harrowing, etc.,	8
5000 plants, including seed,	10
Setting plants,	3
Cultivating, hoeing, etc.,	8
Harvesting and preparing for market,	25
Total cost,	$99
Estimated product,	120 barrels.
Cost, per barrel, ready for shipment,	82½ cts.

Any one unfamiliar with the cauliflower crop will be surprised at the difference in our estimate of yield between the early and late crops, as in one instance we have estimated the product of 7300 plants at 110 barrels, and in the other that of 5000 plants at 120 barrels; but it should be borne in mind that for the late crop it is the usual custom to use a larger variety, which, given more room, produces larger heads. And this, combined with the greater difficulty experienced in growing the early crop, renders our first estimate as liberal as the second. Crops of from 150 to 175 barrels of cauliflowers are by no means rare; but our purpose here is to make the estimate a safe one as a basis for future calculations, and we do not wish to place it so high as to be misleading.

With proper care and attention both of these crops are profitable, and yet we feel inclined to add a final word of warning. Do not embark extensively into the cultivation of these crops in the expectation of becoming wealthy.

We have known many instances where the net profits of the cabbage and cauliflower crops have been sufficient to purchase the land upon which they were grown, and many a man in the locality from which I write rejoices in the ownership of a home and farm made possible by their cultivation, and yet the average profits are not excessive. It is much better to begin upon a small scale and find out by experience the require-

ments of our markets, the adaptability of different varieties to our soil and climate, and what difficulties stand in the way of growing the crop at such prices as our markets afford. Then, with more extended experience and a complete knowledge of our own local conditions, we may extend our plantings to the full limit of our facilities.

CHAPTER XII.

NOTES ON VARIETIES.

I. It is by no means my purpose to undertake a full description of the many varieties which at present comprise the list. The extended descriptions printed in the seed catalogues of the present day render such work unnecessary, and the constant introduction of new sorts would make it of little permanent value. As long as any money is to be made by the introduction of new varieties they will be introduced, even if every point of distinction emanates from the imaginative brain of the enterprising seedsman and the seed sold comes from the same old cabbage. Re-naming old varieties has apparently become a part of the business of the seedsman, and, while we may become a trifle mystified by his elaborate description and illustration, and possibly a little disgusted because we find we have purchased, at an extravagant price, an old favorite under a new name, we cannot regard it as an unmixed evil.

The influence of new introductions is, after all, toward improvement, and even when an old sort is knowingly sent out under a new name, care is taken to secure the best strain of seed for the purpose, and, by this means, many a man, led to purchase by a fascinating name, secures seed which is better than that which otherwise might have been purchased, even though it actually be but the same old sort. The benefits arising from the introduction of anything which is really good are so far-reaching and so large in proportion to the actual expenditure of money for the purchase of seed, that we have come

to regard this practice as working more good than evil to the gardening world.

The introduction of new varieties, or new strains of old varieties, seems to be a necessity, also, from the fact that old strains, when cultivated successively, appear to deteriorate, or "run out," as the farmer would say. To-day you may pass over hundreds of acres of cauliflowers and not find one single plant of that variety which, ten years ago, was the favorite on every farm; while the popular sort of to-day, which we find everywhere, and is the grower's main reliance, is a good strain of an old variety which came to us under a new name.

It is, indeed, well worth while to purchase a new introduction if we can feel reasonably sure that we are purchasing something good. It matters little what means have been adopted to secure improvement so long as improvement has actually been secured. We know, of course, that the actual origination of a new plant is entirely beyond man's power. He can hybridize and, by a series of selection, fix, to a great extent, certain features which he desires to perpetuate upon the hybrid; or he can find, among old sorts, specimens which are apparently sports yet may possess desirable qualities of their own, and these he may establish and improve upon by means of the same series of selection, which seems to be the only means at hand whereby the desired improvement can be attained.

But further than this he cannot go, and anything absolutely new is hardly to be looked for. Neither is it probable that at this day we shall be greatly benefited by the discovery of new forms in the vegetable world. To us the greatest benefits are likely to be attained by that work which aims at the improvement of existing sorts.

VARIETIES OF CABBAGE.

For the purpose of the market gardener we think cabbages may best be considered under four classes, which are divided with reference to their seasons of maturity into *Early*, *Second Early*, *Intermediate*, *and Late*.

The earliest varieties all produce heads of a conical form. This seems to be Nature's law, and, while many attempts have been made to establish flat or round heading sorts which will mature as quickly, the effort has, up to the present time, been unsuccessful. In the mind of the writer there is no question but that the Early Jersey Wakefield is the best early cabbage for the general purposes of the market gardener.

An effort has been made to establish three distinct strains of the Jersey Wakefield. In one case the element of early maturity was, in a measure, sacrificed to size, and the result was given to the gardener in the introduction of the Large or Charleston Wakefield. It may be said that this strain is larger and somewhat later than the parent stock, and we note more variation in the leaf and coloring of the leaves. It is a sure-heading strain and desirable to any one who desires the increased size at the expense of a few days' time in earliness.

The effort to establish an extra early strain of this popular cabbage has not been entirely successful. Here size was sacrificed and selection made from the very earliest specimens, which are frequently the smallest. As a result, we find this strain not only small but rather too finely bred and lacking in vitality, vigor, and hardiness, it succumbs more readily to unfavorable conditions, and is more sensitive to the attacks of its natural enemies than the regular strain, while the claim of earlier maturity is but doubtfully established.

The true **Early Jersey Wakefield** usually sold as Select or Selected Early Jersey Wakefield, is early, reliable about heading, and very uniform; the leaves are dark green in

color and very thick, and the stem short. The plant is a vigorous grower, very hardy, enabling the gardener to carry it through the winter with ordinary care, and seems to possess, in a marked degree, the essential elements of a typical early cabbage. Its greatest fault is the cracking of the heads as soon as they mature, a feature which makes it impossible to hold the crop for any length of time after maturity. Notwithstanding this fault the Early Jersey Wakefield, for more than 20 years, has been the popular first early cabbage, and is today more extensively grown for market than any other early variety.

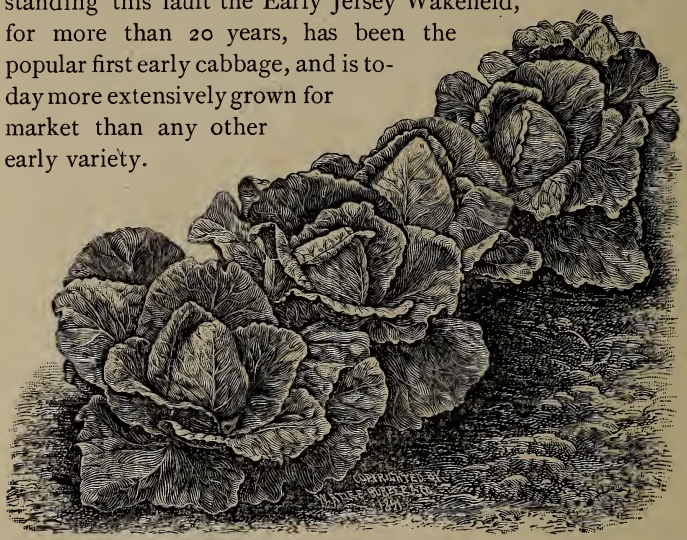

FIG. 37.—Early Jersey Wakefield.

Etampes and **Early Express** are two new French sorts so closely resembling each other as to make a separate description unnecessary. These two varieties have been extensively advertised as the earliest of all, and we have usually found that a few heads can be secured from them before the Wakefield. For practical purposes, however, we do not think them so desirable; the heads are not so large and lack the solidity characteristic of the Early Wakefield, while the con-

stitution of the plant does not appear to be so strong and vigorous. The best strains of these two sorts are very true and head up uniformly and well, and were the claim of extreme earliness well established they might be found very desirable in many instances, but we usually find that although we can find heads among them in advance of the Early Wakefield, we are unable to market the general crop any earlier, while the disadvantages above spoken of render their extended use in the market garden rather improbable.

FIG. 38.—New Extra Early Express.

SECOND EARLY CABBAGES.

Recent years have seen many additions to the list of second early cabbages, most of which have been excellent. To attempt to describe all of them would take more time than we have at our command, and we desire to consider them collectively rather than individually, making mention incidentally of a few of the most prominent sorts of the present time.

The typical second early cabbage is one which combines the essential features of early maturity, size, and reliability of heading. Earliness is desirable because the cabbage is used to

follow closely after our earliest sorts in the markets, but, as this quality is opposed to size, we would prefer a variety which made some concession in earliness in order to secure good-sized heads. The claim made for some of the recent introductions in the second class, that they are just as early as the Wakefield and twice the size, is hardly worthy of consideration.

All of the second early sorts of the flat and round-headed types have an important place in our fields, but that place will not be found in supplanting the early varieties. They are entirely distinct in character, and their place is to follow the early sorts with a larger head of different shape, which packs closer for transportation and, as a rule, commands better prices than the pointed heads of the earliest sorts. In the matter of size we regard with most favor in this class that strain which gives us good-sized heads without excessive growth of plant. With most gardeners economy of space is an important consideration, and the rule is to plant thickly. This is folly with any variety which makes a strong growth of outside leaves, as overcrowding results in various deformities and lessens rather than increases the product; but where a strain of seed has been bred to produce heads of good size with comparatively small outside growth, close planting can be adopted with profit.

The greatest difficulty experienced in growing the second early sorts, when the plants are carried over the winter in cold frames, or in milder climates where they will live out-of-doors during the winter months, arises from a tendency to run to seed, which is quite common to all these varieties. Where growth is continuous from the time of sowing the seed until maturity no difficulty will be experienced, and it is not likely to be found where growth is only occasionally checked by unusual cold, but where the plants stand for weeks practically at a standstill, as they do in northern cold frames or

throughout the northern sections of the Southern States, where the winters do not kill but render growth impossible, the tendency to seed is much more marked in the second early than in the earliest sorts. For this reason the seed of these cabbages should not be planted for cold frames until ten days or two weeks later than the early varieties, in which event the danger of the plants seeding, when growth begins in the spring, is much diminished, or we can use hot-bed plants with safety.

FIG. 39.—Henderson's Early Summer.

Henderson's Early Summer.—This variety is one of our most popular second early sorts. It is a strain of Newark Early Flat Dutch, first introduced by Peter Henderson & Co., and, through extensive advertising, has become so well and favorably known under this name as almost to have superseded the old strain. In point of maturity it is about ten days later than the Early Wakefield. The best strains are very true in color (a bluish shade of green), and their habit of growth is compact, with few outside leaves; it heads up with the greatest regularity, nearly every plant producing a good, hard

head, and all approaching maturity at nearly the same time. It must be admitted, however, that there always has been, even in the very best strains, a tendency to produce heads which are pointed, or nearly so, and which are not desirable, and the best efforts of our seed growers have, so far, failed to entirely eliminate them. This must be considered its greatest fault.

Burpee's Allhead Early (Fig. 40).—This is one of the most recent introductions and commends itself to the gardener as one of the very best of the second earlies. It is

FIG. 40.—Burpee's Allhead Early.

rather larger than the Early Summer, and this increase in size has apparently been gained without lengthening the season of growth, as we do not find any material loss in earliness. It is a sure-heading strain, very uniform in size, color, and habit of growth, and well merits its popularity.

Henderson's Succession (Fig. 41).—This is a trifle later than the two sorts above mentioned, and is valuable as an intermediate as well as a second early sort. It is deservedly popular, producing solid, flat heads of excellent quality; the

growth is strong and vigorous and the plant heads uniformly and well.

Intermediate Sorts.

We class as intermediate those sorts which, in season of maturity follow the second earlies. Their place is an important one for, not only can they be used to follow the second earlies in the markets, but it frequently happens that in the

Fig. 41.—Henderson's Succession.

rush of work incidental to the busy season the planting of seed has been too long delayed to allow a late variety to mature before cold weather, and we find that, by planting the intermediate sorts, we have yet time to obtain a good crop, while the difference in yield is so small as to be of no great importance. These sorts are seldom used for the first plantings, the seed, as a rule, being planted in hotbeds for first sowing, and later in the open ground.

All Seasons (Fig. 42).—This is a most excellent intermediate sort of strong growth and excellent heading capacity. As first introduced it presented considerable diversity of type, but this has been largely corrected in the best strains of the present time. This sort will stand long in the field after maturity without bursting open, which, in some instances, is a very desirable feature. The heads are large and deep, flattened

FIG. 42.—All Seasons.

at the top, and are of excellent quality, and we have found it one of the best winter keepers.

Louisville Drumhead (Fig. 43).—The true strain of this cabbage possesses all the qualities of a most excellent intermediate sort. In season of maturity it is with the All Seasons and about two weeks later than the Early Summer. In

color it is quite distinct, being of a dark bluish shade of green. The plant is of dwarf habit, but produces heads of comparatively large size,—in fact, we know of no cabbage which will produce heads so large in comparison to the growth of plant. It also seems to possess the power of resisting the attacks of insect enemies, and will, in many instances, give crops under conditions where other sorts fail. It heads well in hot, dry weather, and is, withal, a valuable sort. We note with regret, however, that other sorts have sometimes been substi-

FIG. 43.—Louisville Drumhead.

tuted and sold under this name, leading to confusion, and, in many instances, to disappointment, and, without doubt, to some degree detracting from the reputation it would otherwise have established.

Fottler's Brunswick (Fig. 44).—This is one of the older sorts which still retains its popularity. Its distinctive features are a very short stem, a decidedly flat head, and the peculiar spoon-like form assumed by the leaves. Without doubt a good strain of Fottler's Brunswick is an excellent

cabbage and in some localities it is very highly valued, but it must be admitted that a tendency to form rosettes appears to be natural to it, and while a very large proportion of them

FIG. 44.—Fottler's Early, or Short-Stem Drumhead.

form good, solid heads, it is never entirely free from this imperfection. It is a little later than the other intermediate sorts mentioned, but earlier than the late varieties; of compact habit but a strong grower. A number of strains of this cabbage have been developed and sent out under various names.

Warren's Stone Mason is somewhat earlier than the late sorts, and therefore may be classed as an intermediate. It is one of the most thoroughbred sorts we have and the hardest heading variety among the green cabbages. It is a light green in color, growing very true to type, the only variation being in the shape of the heads, which grow both round and flat. Under favorable conditions almost every plant will produce a very solid head of unusual weight in comparison to its size. It is to be regretted that the constitution of the plant is not robust and it is one of the first to succumb to unfavorable conditions.

Late Cabbages.

The ideal late cabbage is one which combines in greatest degree strong, vigorous growth and sure-heading capacity with good table and keeping qualities. The list is a long one, comprising many names, and yet nearly all the prominent sorts are but selections of the Late Flat Dutch and Drumhead stocks, differing from the parent strains according to the ideas followed in their development and the success met with in carrying out these ideas. So many names have been given to these sorts, and the substitution of one for another is so common, as to lead to confusion of varieties in the mind of the average gardener, and it is no uncommon thing to find even close observers who will insist that there is no difference whatever between the two strains of late cabbage known as the Flat Dutch and Drumhead stocks. With this conclusion we are compelled to differ, and must insist that there is not only a technical, but a practical difference, and one which it is desirable to maintain. It must be admitted, however, that in the very best strains of Drumhead we are able to find specimens which, in all respects, seem to be typical Flat Dutch, while Drumheads among the Flat Dutch stocks are by no means uncommon. And yet we think that the line between the two may be clearly drawn and followed with reasonable exactness throughout the entire list of late and intermediate sorts.

In the Flat Dutch varieties the ideal type gives strong but not excessive growth; a head thick, but decidedly flattened on top; a leaf but slightly blistered, with the outer edges nearly smooth or presenting only a slightly ruffled appearance; in color the foliage assumes a bluish cast.

In the late Drumheads we find a more vigorous growth of outside leaf, a brighter green in the color of the foliage, a more distinctly ruffled appearance to the edges of the leaves, and the heads assume a rounder form. The Drumheads are

the larger of the two stocks. It is true that among late cabbages we frequently find plants which possess the character of both stocks, the smoother leaf of the Flat Dutch being sometimes combined with the rounder head of the Drumhead, while others have unquestionably originated from one stock and been changed by breeding to such an extent as to assume the character of the other. For instance, Burpee's Surehead (Fig. 45) is, no doubt, a cabbage of Flat Dutch parentage which, by selection, has come to assume so much of the Drumhead character that we now consider it a cabbage of the Drumhead type.

FIG. 45.—Burpee's Surehead.

We know that many of our gardening friends will be disposed to think that such points of difference as we have mentioned are of little or no consequence in the cultivation of their fields, but let us look a little closer and see if this technical knowledge of varieties cannot be applied to the practical part of our business. If, for instance, we are growing cabbages to be sold in the city markets, the Flat Dutch strains are most desirable, as they present a rather better appearance, pack to better advantage in barrels, and are usually preferred by purchasers. On the other hand, if we are growing them for the pickling establishments, where they are sold by the

ton (an industry of no small proportions at the present time), we should prefer the Drumhead varieties, as a given bulk will certainly weigh more than the same bulk of Flat Dutch.

Besides numerous varieties offered under other names, we have three strains of the Flat Dutch : Excelsior, which is a little in advance of the others in point of maturity, and very uniform and well bred ; Premium, a medium and very reliable sort for main crop ; and the Large Late, which is later and larger than the others.

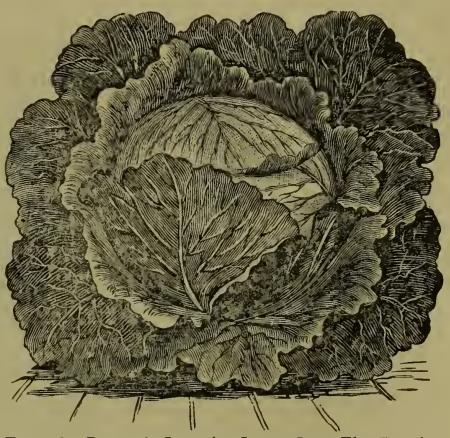

Fig. 46.—Burpee's Superior Large Late Flat Dutch.

Among the Drumheads we are much impressed with the value of a strain called Premium Late Drumhead, which, for our purpose, appears to combine many valuable features.

Both the Savoy and the Red cabbages may be classed as late sorts, although there are strains of each which mature as early as some of the intermediates; these strains, however, produce such small heads that they have never found much favor. We wonder exceedingly that more Savoy cabbage is not grown as a late or winter cabbage. It is true that some of the old sorts were unreliable and very small, but the newer introductions head with as great regularity as most cabbages, are excellent keepers, and of the finest flavor. Perfection Drumhead is finely curled, sure heading, and excellent in all respects. Marvin's is larger but hardly as well curled.

Marvin's Savoy Cabbage.—Tested at the New York Agricultural Experiment Station, this new strain of Drumhead Savoy Cabbage was reported on as follows: "Twelve plants transplanted June 23d. Fit for table use August 29th. Number of heads, 12; average diameter, $8\frac{9}{10}$ inches; average weight, 5 pounds 14 ounces." This was the only variety they made a special mention of, and said: "Among those deserving of special mention was Marvin's Savoy, of which the

FIG. 47.—Marvin's Savoy.—*Engraved from a Photograph.*

heads were very large, and nearly as compact as those of the more solid, smooth-leaved varieties."

Savoy cabbages, as you are doubtless aware, are all of very sweet flavor and are really superior for cooking.

Red cabbages are in demand for pickling during the late fall and early winter months, at which season they can usually be disposed of to good advantage. It is not advisable to

keep them till spring, and if not disposed of during the fall they should be stored in the manner recommended for early winter use. Mammoth Rock Red is a great favorite, producing large, solid heads, true to color and reliable about heading.

Burpee's Safe-Crop Cabbage (Fig. 48) is a large, late strain of market gardener's cabbage, which is sure to head. The heads are of large size, hard and firm, with but few outside leaves; stems short, foliage compact, and of a beautiful green

FIG. 48.—Burpee's Safe-Crop Cabbage.

color. The plants are thrifty, easily transplanted; set in rows three feet apart and two feet in the rows to admit of cultivation. It is a very desirable variety for a late crop on account of its solidity, and because it is an excellent winter keeper. It also stands a considerable time without bursting. In quality it is not quite equal to Burpee's Surehead as a summer cabbage, being slightly strong, but it improves as the season advances, making a winter cabbage hard to equal. The thick, flat heads are remarkably uniform in color, as well as in shape

and size; it is a rapid grower and well repays good cultivation. It is very tender and juicy at all stages of growth, cares little for the worms, and will stand a hot, dry time remarkably well.

Burpee's World-Beater Cabbage.—This new cabbage (which was procured from Francis Brill) originated near Hoboken, in Hudson County, N. J., and well deserves the name World-Beater, for never before have we seen any cabbage that produces such uniformly large heads, or any very

FIG. 49.—Burpee's World-Beater.

large cabbage in which the heads were so hard and solid. We predict that in a few years the Marblehead Mammoth will be discarded, for not only is World-Beater fully as large, if not larger, but also it is uniformly true to type and sure to head hard—"solid as a rock." The large, broad heads are very thick through, rounded at the top; fine grained and tender,—more so than any other very large cabbage. Stalk short, foliage compact, dark green with a purplish-brown tinge. It is a rapid grower, and does not require special culture to develop.

It is not our purpose to enter further into the description of varieties, but we cannot refrain from expressing a hope that the fact that many excellent varieties are not mentioned here will not be construed as an effort on our part to detract from their merits. We have always been impressed with the influence of local climatic conditions upon different varieties, and regard the experience of the grower in his own locality as the safest guide. The opinions of a grower in New York are of doubtful value to a grower in Florida or Canada, and these notes on varieties are appended, not so much to influence his selection of sorts, as in the hope that some of our suggestions may be valuable when supplemented by the conclusions which his own practical experience gives. As one year follows another new varieties will come and old ones go. Those processes, so well known to the cultivator, will be all-sufficient to separate the good grain from the chaff, while the impetus given to the work of developing the plant to its fullest degree of usefulness by the increasing demand for the very best of each class will certainly operate to the benefit of the grower.

VARIETIES OF CAULIFLOWERS.

II. The varieties of cauliflower are by no means as numerous as those of cabbage, and the list does not appear to be increasing to any great extent. In looking over the experiences of the past fifteen years, in a section of country which is probably more extensively engaged in the cauliflower culture than any other in the United States, we are impressed with the completeness with which one variety has succeeded another—in fact, there is no other vegetable in the garden in which the recent introductions have so completely superseded the old sorts.

Our first experiences were with such sorts as *Early Paris*, *Nonpareil*, *LeNormand's Short Stem*, etc., which were never

too reliable, but under the conditions of new land and thorough cultivation gave fair crops, and very paying ones, at the high prices then ruling. A few years later these sorts had dropped entirely out of existence with the introduction of the Algiers, which, when first introduced, was much better than any of the first named sorts. To-day we note another change; we may now pass through hundreds of acres without noticing a single plant of the Algiers variety, so entirely has it been replaced by the Erfurt strains. To our mind the latter change would not have been so complete, but for the fact that the strain of Algiers seed sold seemed rapidly to deteriorate. If it were possible to secure, with any degree of certainty, the same stock first introduced under this name, we should still find it filling a prominent place in our fields; but after a few years of cultivation we found ourselves no longer able to obtain the true strain, and discarding it became a necessity.

Algiers.—When true, this sort is of vigorous growth, with long leaves which taper to a decided point at the ends; its color is of a decidedly bluish cast, and in this respect good strains are very uniform. It should be a very sure-heading sort, producing large, solid, white heads, free from leaves, and of excellent quality.

Veitch's Autumn or Italian Giant.—We mention this sort, not to commend it, but to offer a word of caution. It much resembles the Algiers in color and habit of growth, and, if it can be made to head at all, the heads are similar. We find it so slow in reaching maturity as to be practically worthless in this section. Possibly it may be valuable in localities favorable to its development; but to our mind the grower should plant it sparingly until he finds it will mature the heads.

The Erfurt strains, of which there are several, appear to be at the present time our most reliable sorts. It may be said

that there are at least three distinct strains of Erfurt, which, when true, leave little to be desired, provided the locality in which they are grown is favorable to their development.

Earliest Dwarf Erfurt (Fig. 50), sometimes called Extra Early, or Narrow-Leafed Erfurt, is a very dwarf variety and the earliest of the Erfurt varieties. It is very valuable for our earliest, as well as latest planting, as it reaches maturity so quickly as to enable the grower to secure a crop in the event of his planting being delayed until too late to plant the later

FIG. 50.—Earliest Dwarf Erfurt Cauliflower.

strains. It is very reliable about heading, producing heads of the finest quality, although not so large as the later and larger growing sorts.

Early Snowball (Fig. 51) is a variety of Erfurt which, since it has been extensively advertised under this name, has attained great popularity, and is now the main reliance for the most extensive plantings. It is of dwarf habit, but not so small as the first mentioned strain, and the heads are much larger. Under favorable conditions nearly every plant will make a fine, solid head of good size. Although not so early

as the Earliest Dwarf, it is valuable both for the early and the late crops, and, taken altogether, we find it the most reliable of the Erfurts.

The Large Erfurt is the largest and latest of the Erfurts; is, perhaps, two weeks later than the Snowball; is reliable about heading, but does not mature its crop so evenly as the earlier strains. This variety is valuable mainly for the fall planting, for which purpose it is used largely and prized highly.

All of the Erfurts are similar in color, a rather bright shade

FIG. 51.—Early Snowball Cauliflower.

of green, and in habit of growth, the distinctive features being found in the size of the plant and season of maturity.

Burpee's Best Early Cauliflower.—Named and introduced by W. Atlee Burpee & Co. in 1887, this grand variety has proved to be, as claimed, the very best early cauliflower in cultivation. It has attained its present perfection after sixteen years' intelligent selection by one grower, and is remarkable both for its extra earliness and certainty to head. Of dwarf, compact growth, with short stalk, it bears close planting, and

the leaves, growing upright, naturally protect the heads. The large, handsome heads, measuring eight to ten inches across, are pure, snowy-white, very close, compact, and of the finest quality. So extremely solid and deep, nearly globe-shaped, are the heads, that they weigh heavier than most, if not all

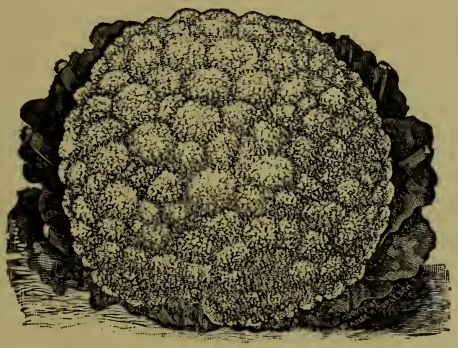

FIG. 52.—Burpee's Best Early Cauliflower.

other cauliflowers of the same size. Market gardeners can use "Burpee's Best Early" for either early or late, with full assurance that it is impossible to procure a better or more reliable variety.

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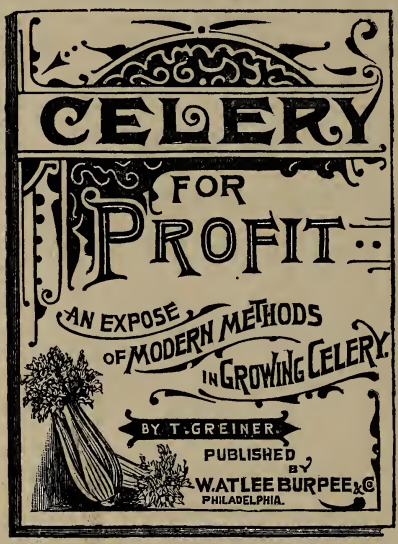

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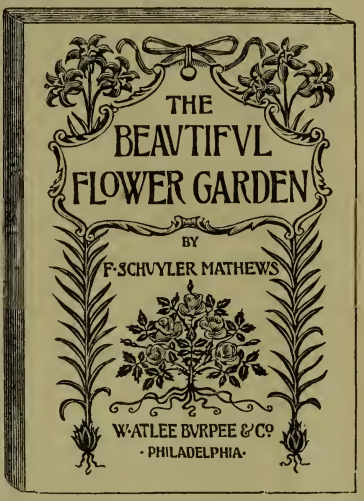

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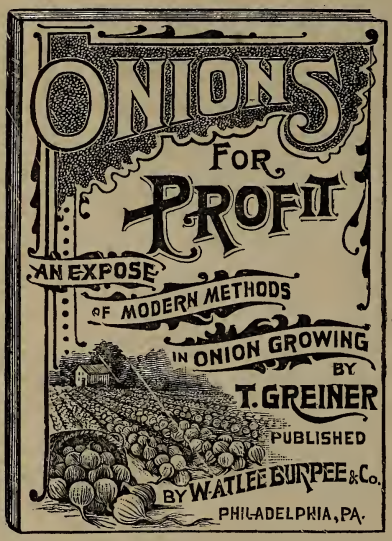

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